Bridging the Gap between Communities at Risk of Flooding

and

Flood Risk Communication Agencies:

Developing Effective Flood Risk Communication Strategies

By

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ABSTRACT

A paradigm shift towards adaptive governance of flood risk management has taken root in Europe over the last two decades. Adaptive governance has been conceptualised as a form of governance which is built through a multi-layered web of horizontally and vertically aligned stakeholders and has been termed as Sustainable Flood Risk Management (SFRM) in Scotland. SFRM in Scotland aims to promote community empowerment to build resilience against flooding, including through flood risk communication. Flood risk communication involves raising awareness of flood risk among communities and issuing flood warnings to them when needed. Although flood risk communication between agencies of the government and communities living in the areas identified to be at risk of flooding has long been a subject of policies and legislation, literature on flood risk communication indicates that a substantial gap in perspectives on flood risk remains between these social actors. Similarly, although media hold a central position in flood risk communication as conveyers of messages, literature indicates that the role of media has not been appraised satisfactorily so that it can inform media selection for flood risk communication. This thesis presents research which was aimed at addressing both these needs.

Accordingly, the aim of this thesis was to identify gaps in flood risk perspectives between 'communicating agencies' and 'communities at risk of flooding', and to evaluate the suitability of various media types for flood risk communication. Correspondingly, the objectives of the research were: i)to understand community knowledge, expectations, and media usage and preferences related to flood risk communication; ii) to review communication objectives and efforts of the responsible agencies; iii) to identify differences between community knowledge, expectations, media usage and preferences, and the communication efforts of the responsible agencies; iv) to appraise the role of Habermas's Theory of Communicative Action and Media Synchronicity Theory in supporting the development of flood risk communication strategies; and iv) to consider the implications of the findings for developing effective flood risk communication strategies by the relevant agencies and make appropriate recommendations.

The research entailed investigations into flood risk perspectives of the communities living in areas identified to be at risk of flooding (termed as 'emic' perspective) and that of the agencies responsible for flood risk communication (termed as 'etic' perspective) in order to generate shared understanding on flood risk, especially on community knowledge, expectations, media usage and preferences, and the communication efforts of the responsible agencies. Habermas's Theory of Communicative Action and Media Synchronicity Theory proposed by Dennis et al. were selected for investigating their applicability in supporting development of flood risk communication strategies and formulating policy recommendations.

The research adopted an inductive research stance, with interpretivism as the epistemological paradigmatic position and constructionism as the ontological paradigmatic position. Data relating to the perspectives, experiences and communication needs of members of the communities living in areas identified to be at risk of flooding were collected through postal surveys, one-to-one interviews and focus groups in three locations in Scotland: Edinburgh, Stirling and Callander. The research also carried out interviews with representatives of government agencies which were endowed with statutory responsibilities for flood risk communication with the communities, including the Scottish Environment Protection Agency (SEPA), The City of Edinburgh Council, Stirling Council, Central Scotland Police, Lothian and Borders Police and Central Scotland Fire & Rescue Services.

The research found substantial gaps in terms of knowledge, levels of preparedness, understanding of responsibilities and sources of information in the field of flood risk communication in Scotland at the levels of legislation, policy and practice; and these contrasted sharply with the societal goal of SFRM. Furthermore, the expectations of the communities on flood risk communication differed significantly from the understandings of the communicating agencies. The research also found serious gaps in terms of media use and preferences between communicating agencies and the concerned communities at risk of flooding. These gaps in communication appeared to have contributed to loss of trust and credibility of the agencies amongst the communities. The research also found that practicing 'communicative action' proposed by the Habermas's Theory of Communicative Action, which entails stakeholder engagement to reach agreements on issues of concern, contributes to development of understanding and

generation of strategies which are oriented towards reducing gaps between agencies and the communities at risk of flooding. However, it was found that none of the agencies practiced 'communicative action'. It was also found that Habermas's Theory of Communicative Action has limited applicability for addressing flood risk communication, principally pertaining to its inability to fulfil the subtask of flood warning. Other limitation of the theory relates to inability of the theory to account for the need for 'audience segmenting' for flood warning to ensure reach to all members of the communities who may belong to different segments, such as, based on age, language and disabilities. The principal limitation of this theory, which is related to the subtask of flood warning, was found to be similar to the limitation of the Media Synchronicity Theory. It was found that Media Synchronicity Theory, in its current form, has only partial or limited applicability in informing media selection for flood risk communication, especially flood warning. It was also found that it relies only on capability of media and fails to account for the factors influencing media preference and choice of institutions and communities.

Based on the findings of the research, the thesis makes many recommendations to the agencies and Scottish Government for changes in flood risk communication policies and strategies, specifically aimed at improving flood risk communication in Scotland. Among these are an amendment to The Flood Risk Management (Scotland) Act 2009 to include a requirement to hold dialogue with communities, to review and monitor communication activities of the agencies and empower agencies by capacity building. Other policy recommendations relate to development of agency-specific flood risk communication strategies, building up of trust, emphasis on raising awareness, and most importantly, tailoring of messages for media and audience and usage of the most appropriate media.

To

My Lovely Husband Deepak (Raja)

and

My Beautiful Daughters Khushi (Tinu) and Harsha (Tillu)

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GLOSSARY

BBC	British Broadcasting Corporation
CCA	Civil Contingencies Act
CEC	The City of Edinburgh Council
CIRIA	Construction Industry Research and Information Association
CSF&RS	Central Scotland Fire and Rescue Service
CSP	Central Scotland Police
DEFRA	The Department for Environment Food and Rural Affairs
EC	European Commission
EU	European Union
FRM(S) Act	Flood Risk Management (Scotland) Act 2009
IEM	Integrated Emergency Management
LBP	Lothian and Borders Police
IPCC	Intergovernmental Panel on Climate Change
LiDAR	Light Detection and Ranging
MMS	Multi-Media messaging Service
NTAG	National Technical Advisory Group
SARF	Social Amplification of Risk Framework
SC	Stirling Council
SCG	Strategic Coordination Group
SEPA	Scottish Environment Protection Agency
SFRM	Sustainable flood risk management
SMS	Short Messaging Service, also referred to as ‘text message’
SWF	Surface Water Flood
UK	The United Kingdom

Chapter 1
Introduction

1.1 Background

Flooding can be defined as "a temporary covering of land by water outside its normal confines" (H. R. Wallingford 2009). Floods are the most frequently reported and costly natural disasters world-wide (Parker 1998). However, flooding is a natural process which also provides benefits, including enriching soils and maintaining natural habitats (Carter et al. 2009), and it becomes a cause of concern or 'risk' only when it affects lives or properties (United Nations Environment Programme (UNEP) 2004 cited in Gavilanes-Ruiz et al. 2009).

Further, the level of threat posed by floods is predicted to increase in view of climate change which will lead to increased storm frequencies and surges, increase in the intensity of extreme storm events and rises in sea level (IPCC 2007). This in turn is predicted to expose significantly greater numbers of properties and people to risk of flooding (Bates et al. 2008). It may also expose properties which were not at risk of flooding in the past to risk of flooding as climate change is predicted to result in regional changes to flood distribution (IPCC 2007).

Flood risk communication which empowers communities by raising awareness and by providing advice and warnings to take preventive and protective actions has long been identified as one of the tools of management of flood risk. This thesis presents research on flood risk communication carried out in areas identified to be at risk of flooding. It especially deals with identifying gaps in flood risk communication between the communities living in the areas identified to be at risk of flooding and the agencies responsible for flood risk communication. It also examines the selection of preferred media for raising awareness about flood risk and for communicating flood warnings in light of Media Synchronicity Theory, a media theory proposed to aid such a task. The research is informed by the Theory of Communicative Action, a social action theory proposed by Habermas. The research was carried out with data and information relevant to Scotland, and therefore, it has a Scottish context.

1.2 Adaptive governance of flood risk management

The word '*governance*' has been derived from the Greek verb '*kubernan*' meaning to steer a ship which involves the process of continually orienting and adjusting (Stewart-Rattray 2012). Governance in the modern world is widely acknowledged to be the authority endowed to institutions to allocate resources and coordinate activities. Adaptive governance is the form of governance which accepts and responds to uncertainty by promoting learning in and through the policy-making process (Cooney and Lang 2007). According to Cooney and Lang (2007), it does so in a number of ways: by avoiding irreversible interventions and impacts, by encouraging constant monitoring of outcomes; by facilitating the participation of multiple voices in transparent policy-making processes; and by reflexively highlighting the limitations of the knowledge on which policy choices are based. Thus, in adaptive settings, institutional rules are continuously reconsidered and adjusted to match the complex and ever-changing environment (North 1990) which is the case with the management of flood risk, as elucidated below.

As Krieger (2012) points out, it has long been realised that complete elimination of flood risk is neither technically possible nor environmentally and economically feasible. The use of engineered flood defences such as embankments and dykes has increasingly been viewed as counterproductive as, Krieger (2012) summarises, flood defences are known to fail in providing safety, have adverse effects on natural retention space for water, create a false public sense of security and are costly to build. Instead, an approach emerged across Europe in the 1990s and 2000s that introduced a wider range of flood management measures such as land-use management/planning, flood insurance, flood risk communication and environmental policies such as preserving wetlands. By recognising the difficulty to fully control flooding and the shortcomings of flood defences, these measures aim at 'making space for water/rivers' (Krieger 2012). Thus, there has been a shift in government policies towards 'learning to live with the rivers' (Fleming 2002a; Fleming 2002b) 'making space for water' (DEFRA 2005) and 'living with floods' (Johnson et al. 2007) in contrast to earlier emphases on hard defences such as flood protection works (Krieger 2012).

This adaptive approach towards flood risk management or adaptive governance of flood risk management is termed as Sustainable Flood Risk Management (SFRM) in

Scotland. This is also referred to instead as Flood Risk Management elsewhere in the UK (Cashman 2007). In line with the core principles of *adaptive governance*, SFRM in Scotland marked a paradigm shift in governance of flood risk by including societal and environmental concerns in the *'government supported, facilitated and enabled flood risk management'* (Cashman 2007). Thus, SFRM in Scotland aims at a form of governance of flood risk which is built through a multi-layered web of horizontally and vertically aligned stakeholders who orient themselves and work together for the common goal of sustainable management of flood risk (Cashman 2007). To address societal concerns related to flood risk, SFRM aims to build resilience to floods through individual self-help and community capacity building initiatives such as making communities aware of flood risks, warning them prior to flooding and providing assistance during and after floods as well as by including a wide range of stakeholders in decision making. Thus, flood risk communication between institutions and communities, as one of the stakeholders, forms an integral part and tool of SFRM.

It should be noted here that 'insurance against damage due to flooding' as a tool for flood risk management has also received additional attention in emerging flood management approaches (Krieger 2012). It has been argued that flood risk insurance can be an effective tool in assisting the restoration of damaged property after a flood event and sustaining communities through difficult times by providing direct economic incentives to individuals to relocate or take their own precautions against flood (Lamond 2009) while at the same time facilitating rapid economic recovery after a flood (Crichton 2008). However, it was found that some floodplain residents encounter difficulties when seeking insurance for their homes (Lamond 2009), insurance companies would not cover all the losses, their payouts could not be used to improve resilience of their homes to future floods, premiums and excess charges were considerably increased, and in some cases further insurance was even refused (Wamsler & Lawson 2011). Moreover, success in gaining insurance may lead to complacency among residents who see no advantage in pursuing other, more costly, damage mitigation actions (Lamond 2009). Therefore, similar to above listed option of hard defences, insurance cannot be considered as a sustainable tool for flood risk management. Nevertheless, it remains a strategically valuable tool for flood risk management, especially for the existing properties at risk of flooding.

1.3 Objectives of flood risk communication

Apart from being an important tool for sustainable flood risk management, as has been explained above, flood risk communication also forms part of the people's right to be informed of the risks to their lives and properties. The Aarhus Convention 1998[1] establishes the public's rights to information, to be heard and to have those interests properly considered (Green & Penning-Rowsell 2010). This societal objective – the right to be informed – highlights the importance of flood risk communication within sustainable flood risk management and therefore within adaptive governance of flood risk management.

The second objective of risk communication can be stated to be facilitating flows of information and dialogue at all stages of risk governance, (see Figure 1.1). International Risk Governance Council's (IRGC) Risk Governance Framework was originally proposed by Renn (2008) and it argued that risk communication holds a central position in risk governance by interlinking and facilitating flows of information and dialogue between the other four elements of risk governance: Pre-assessment, Appraisal, Characterisation/Evaluation and Management.

[1] The United Nations Economic Commission for Europe (UNECE) provides the text of the Convention in six languages at the Convention's official website http://www.unece.org/env/pp/. The Department for Environment Food and Rural Affairs (DEFRA) also provides information on the Aarhus Convention at: http://archive.defra.gov.uk/environment/policy/international/aarhus/. Among other EU member states, the UK is a signatory of the Convention.

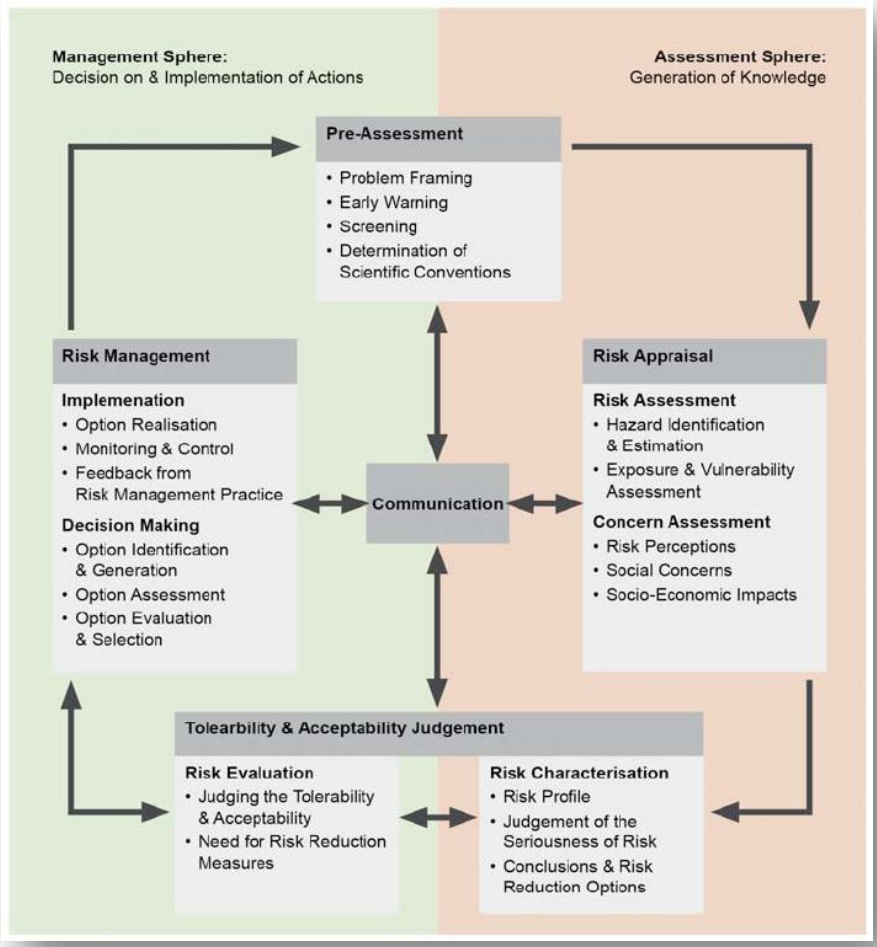

Figure 1.1: Communication within risk governance (IRGC 2009 cited in Höppner et al. 2010)

Apart from the previously mentioned objectives of risk communication, literature offers a much comprehensive set of objectives for risk communication, usually centred on a risk management agency as the communicator and groups of the public as target audiences, as listed below (Covello et al. 1986):

i) *Enlightenment function* (to improve risk understanding among target groups);

ii) *Right-to-know function* (to disclose information about hazards to potential victims);

iii) *Attitude change function* (to legitimate risk related decisions, to improve the acceptance of a specific risk source, or to challenge such decisions and reject specific risk sources);

iv) *Legitimation function* (to explain and justify risk management routines and to enhance the trust in the competence and fairness of the management process);

v) *Risk reduction function* (to enhance public protection through information about individual risk reduction measures);

vi) *Behavioural change function* (to encourage protective behaviour or supportive actions toward the communicating agency);

vii) *Emergency preparedness function* (to provide guidelines for emergencies or behavioural advice during emergencies);

viii) *Public involvement function* (to educate decision makers about public concerns and perceptions);

ix) *Participation function* (to assist in reconciling conflicts about risk-related controversies).

In addition, extant policies and legislation may require that a risk management agency shall communicate on risks to the public. Hence an additional objective of risk communication can be stated as:

x) *Fulfilment of legal duties function* (to fulfil legal requirements of carrying out risk communication).

Flooding being a risk, the Risk Governance Framework and the above stated objectives of risk communication are relevant to governance of flood risk. A similar set of objectives specifically for flood risk communication has been collated by Kellens (2011) while noting that several researchers (e.g. Correia et al. 1998, Bell and Tobin 2007, and Hagemeier-Klose and Wagner 2009) have emphasised the role of flood risk communication to strengthen people's risk awareness and to motivate the population at risk to take preventive actions and to be prepared for an emergency.

1.4 Evolution of flood risk communication

In the context of the objectives of risk communication discussed in the previous section, governance can be defined as:

> *"The exercise of political, economic and administrative authority in the management of a country's affairs at all levels. Governance comprises the complex mechanisms, processes, and institutions through which citizens and groups articulate their interests, mediate their differences, and exercise their legal rights and obligations"(UNDP 1997 cited in Green 2010).*

The above definition of governance is concerned with the joint problems of how to decide what to do, and then do it. It also highlights the 'power' extended to the citizens or public, where power can be defined in a functional sense as the capacity to induce change (Green 2010). The term 'governance' instead of 'government' emphasises the decline in the power of central government to steer society and draws implicit attention to the ways in which government interacts with civil society to reach mutually acceptable decisions about the direction in which society is travelling (Thorne et al. 2007). However, it raises further concerns about the allocation of power between the institutions, groups and public, and about its range or what it should encompass. According to Green (2010), the range of power must encompass all of that which is to be changed and have sufficient strength to induce changes or resolve conflicts resulting from differing interests. In this sense, effective governance is all about establishing objectives, defining rules and boundaries, identifying tasks, contexts and resources, and social power – the ability to understand social relationships and to influence others (Green 2010). Effective governance, thus, involves understanding what is theoretically and practically possible, assessing the current state of technology, methods and resources, and finding ways which would lead to increased and shared understanding among the public of flood risk (Green 2010). This discussion clearly identifies the importance of engaging and establishing dialogue with a wide range of stakeholders.

However, a review of the risk communication literature reveals that risk communication in the past did not involve the concept of stakeholder engagement. Much of the early work on risk perceptions concentrated on trying to develop linkages between perception and response assuming that it would assist the development of risk communication tools and that it would make it possible to 'educate' the public (Gough 2000) or change their perceptions of risk to make them closer to so-called 'expert'[2] perceptions (Gough 2000). Sjöberg (1998) argues that this often led to the adoption of public relations (PR) approach to risk communication which sees the public as ignorant, emotional, and superficial. Fischhoff (1995) collates the evolution of risk communication approaches starting with a clear 'top-down' or 'technocentric' approach to a more recent 'horizontal' or 'stakeholder engagement' approach, as summarised in Table 1.1.

[2] The term 'experts' is used here and in the remainder of the thesis to represent the scientists, engineers, modellers and asset managers, essentially the technologically elites or technocrats who are entrusted with the assessment of flooding phenomenon and with flood risk management initiatives through the application of technical and scientific knowledge they possess.

Table 1.1: Development of risk communication approaches (Fischhoff 1995)

All we have to do is get the numbers right
All we have to do is tell them the numbers
All we have to do is explain what we mean by the numbers
All we have to do is show them that they've accepted similar risks in the past
All we have to do is show them that it's a good deal for them
All we have to do is treat them nice
All we have to do is make them partners
All of the above

The field of flood risk communication has not been immune to the above mentioned approaches of risk communication in the past - it too has been undergoing a marked shift towards more participatory approaches. For example, the European Union Flood Risk Management Directive in Article 10 (2007/EC/60) promotes the active involvement of interested parties.

Going beyond the approach of engaging stakeholders, recently, a new concept termed as 'flood risk citizenship' has been proposed by Nye et al. (2011). It advocates promotion of community engagement and personal or community level responsibility for flood risk planning, awareness and resilience - thus shifting the responsibility from the government and agencies to the individuals and businesses. A further refinement in the field of risk communication has been the application of marketing concepts, such as 'strategic marketing' or 'social marketing' (Young & O'Neill 1999, Barr et al. 2006, DEFRA 2008).

The term 'social marketing' was first coined by Kotler and Zaltman (1971) in a paper in the Journal of Marketing, defining it as: 'the design, implementation and control of programmes calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution and marketing research' (Peattie et al. 2012). Many definitions exist among which Peattie et al. (2012) recommend: 'Social marketing is a process that applies marketing principles and techniques to create, communicate and deliver value in order to influence target audience behaviours, that benefit society (public health, safety, the environment and communities) as well as the target audience' (Kotler & Lee, 2008).

For 'strategic marketing' or 'social marketing', the audience is 'segmented' into subgroups wherein the members of the subgroups bear similarities such as belonging to a certain age group, etc. Some of the segmented audience is then 'selected' through decision making process and 'targeted' through risk communication. The audience identified for targeting, which may contain more than one subgroup, is then subject to 'positioning' which entails customised communication with those segments of the audience (Wright et al. 2012).

The audience segmentation approach within an environmental context for social marketing and communications or campaign strategy has been further developed as a 'Values Modes' approach (Mont et al. 2009). As explained by Rose and Dade (2007) it divides a target population into three broad segments: Settlers (security driven), Prospectors (esteem driven) and Pioneers (inner directed). These segments can further be subdivided into four 'Values Modes' each, thus segmenting the population into twelve Values Modes

According to Crompton (2008 cited in Mont et al. 2009), the Values Modes approach places particular emphasis on engaging Prospectors (outer-directed or esteem-driven individuals) who are resistant to the traditional exhortations for behavioural change based upon environmental concerns and moral imperative approaches that may work better for Pioneers. He also states that this group also includes some of the most voracious consumers. Since Pioneers are normally at the forefront of 'change', Rose (2012) contends that for the purpose of 'mainstreaming', a change campaign would usually need to somehow appeal to Settlers and Prospectors, if they are to achieve society-wide or any significant change. According to him, Prospectors and Settlers will not usually join campaigns and may act in other ways which campaigners may fail to notice. To explain this, Rose (2012) refers to psychologist and economist Daniel Kahneman who with Amos Tversky proposed that when faced with hard-to-make decisions, people tend to unconsciously substitute an easy decision for a harder one because the harder decision requires that one be reflective - which requires consciously processing facts and information, applying tests of logic, and is hard work. Therefore, he contends that, in conditions of time pressure and high uncertainty, individuals tend to opt for reflexive thinking, also known as 'emotional' or unconscious decision-making. Rose terms these easier or more comfortable short-cuts as heuristics or rules of thumb

about how communications generally work. He asserts that most campaigns, especially those run by older NGOs and public bodies, are in need of a psychological makeover.

Thus, Values Modes is a psychographic mapping system which looks at the values that underlie the behaviour of individuals. It puts more emphasis on understanding the people in the population than the technical aspects of the issues. As an example Rose and Dade (2007) present the problem of preparing communities for, and warning people about floods - the subject matter of this thesis. They state that, in doing so a wide range of profound social and psychological communications issues arise in evaluating and analysing, preparing for, mitigating, avoiding, warning of, dealing with and recovering from floods which include, but may not be limited to: the unknown; identity, belonging community; loss (emotional, social, physical); fear, anger or powerlessness; trust and power held by others; dilemmas and decision making; perceiving, judging and planning or not; the past and the future; forces beyond our control; problems of cooperation or coordination; comprehension and conceptualisation of components of 'risk'; sense of place and personal location; and sense of agency, competence, capacity. Therefore, they argue that 'floods' raise 'non-technical' communications challenges which have nothing much to do with water or engineering, or even economic costs and benefits. According to them, these factors are to do with people, rather than floods themselves. As such they contend that to understand how best to deal with these challenges in communications strategies, we need to start with people. Such an approach has indeed been utilised in England and Wales where the Environment Agency has been experimenting with more targeted flood warnings (Langley & Broughton 2008).

Important to note though is that audience segmentation is very dynamic and varies with time as well as the issue / problem. As an example, it has been demonstrated that the number of Settlers in Great Britain has been reducing (Rose and Dade 2007) and Mont et al. (2009) report studies which demonstrated that segments for 'food' were very different from segments for 'housing', and that the people who responded to certain measures to change their diets (food domain) required a totally different policy mix to change their mobility patterns. Therefore, this can mean subdividing flood communication task into two subtasks: i) issuing warnings, which requires a quick timescale in terms of speed of communication and response, and ii) raising awareness, which can be undertaken over a comparatively leisurely timescale, together with

variations in demographics of target population and their various segments, and employing a substantially different set of approaches. Additionally, these approaches may need reviewing or changing over time.

Thus, in summary it can be seen that the approaches to communicate flood risk have been evolved over time and have become more and more oriented towards the communities and then towards individuals. These communication approaches entail varying degrees of engagement of the communicators with the target audience. In the context of above discussion on flood risk communication approaches, the degree of engagement can be broadly categorised as one-way or top-down communication approach which entails transmission of messages to the intended audience and a two-way or 'horizontal' communication approach which entails engaging and establishing dialogue with a wide range of stakeholders. Correlating these with the subtasks of flood risk communication, which are issuing warnings and raising awareness, it can be noted that timescale in terms of speed of communication and response also play a vital role in defining the category of communication: one-way or two-way. This indicates suitability of one-way or top-down communication for issuing flood warnings and that of two-way communication or stakeholder engagement for raising awareness about flood risk and related issues. The following two sections discuss the role of knowledge claims and the process of stakeholder engagement whereas the subsequent section discusses the suitability of various media for one-way and two-way communication.

1.5 The etic and emic perspectives in flood risk communication

One of the major difficulties in engaging and establishing dialogue with a wide range of stakeholders, who range from lay people and organised pressure groups to the scientific community and other relevant agencies of the government, has been known to be their differing perceptions of risk (Thorne et al. 2007). Risk perspective or perception is a term that refers to one's awareness and knowledge of hazards, including potential consequences associated with a situation or set of circumstances (Wogalter et al. 1999). Many researchers argue that individuals and communities respond to risk and risk information according to their perceptions and understanding of the risk (Rogers 1997) and that being informed about levels of risk, severity and efficacy jointly produce greater rates of willingness to take actions designed to avoid the hazard (Kurt et al. 2000). Thus, risk perception influences public behaviour, expectations and government

response, and therefore it has implications for the design of flood risk management policies and the effective delivery of responses (Thorne et al. 2007) and thus the governance of flood risk management.

The task of converging risk perceptions of the communicators and the public raises the vital question of how risk perception is formed by the communicators and the public. While it has been contended that the public tends to deny flood risk (Burningham et al. 2008) and define flood risk differently than 'the experts' who act as the communicators of flood risk (McCarthy 2004 cited in Faulkner et al. 2010), it has also been argued that 'the experts' make assumptions about the character of the risk situation that are quite removed from the experiences of those at the actual site at risk (Fischer 2000 cited in Winnubst 2011). The risk perception of 'the experts' can be regarded as the 'outsider perspective' whereas the risk perception of the members of the public who actually live in the area at risk can be regarded as the 'insider perspective'. These terms - 'outsider perspective' and 'insider perspective' which originated in the field of linguistics and anthropology – are termed as 'etic' and 'emic' respectively. Although these perspectives are complementary in the sense that they often present the same data from two points of view (Pike 1967 in Fielding and Fielding 2008), they also explain the need of flood risk communication: to converge these perspectives (Schelfaut et al. 2011). Convergence of etic and emic perspectives of flood risk means that the perspectives on flood risk of the communicating agencies and that of the population living in flood risk areas match or represent the same attribute of flood risk.

This raises vital questions: i) Why do the etic and the emic perspectives of flood risk not converge? and ii) How can flood risk communication strategies benefit by understanding why they do not converge? Furthermore, adaptive risk governance is particularly expected to address challenges that result from a lack of knowledge and/or competing knowledge claims about risks where a risk is characterised by complexity, uncertainty and ambiguity (Klinke & Renn 2012, van Asselt & Renn 2011, van Asselt & Bree 2011 and Renn et al. 2011). These are also the characteristics of flood risk since it transcends geographical and administrative boundaries, and has associated uncertainty and ambiguity in view of climate change and complexity of associated assessment methods. Additionally, this is also evident from the discussion in the next chapter on various sources and causes of flood risk, its effects and management of flood risk.

Since risk perceptions are formed partly on the basis of 'knowledge', these questions are tackled here by explaining how the etic and emic perspectives are formed by referring to the instrumental position of 'knowledge' in shaping these perspectives.

Knowledge is identified to be a societal property or an asset existing in the minds of individuals which is made available for collective action to meet societal goals (Etzioni, 1968 cited in Winnubst 2011). Knowledge can be broken down into three subtypes: scientific or technical knowledge (the domain of 'the experts'), political and administrative knowledge (the field of expertise of government decision-makers and government officials in particular) and public knowledge (particularly expertise of the citizens) (Winnubst 2011). The first two subtypes pertain to the etic perspective whereas the latter to the emic perspective and are explained below.

It has been contended that it is the task of science to disclose and assess sources of potential harm, identify measurable correlations and assess the probabilities of harm (Boholm 2003) in order to generate knowledge that would facilitate risk management. The experts, and thus the risk communicators, become 'knowledgeable' mainly by performing scientific assessments based on facts, probabilities and calculations (Boholm 2003, Figueiredo et al. 2009), which in turn form the etic perspective. Thus, the etic perspective is based on an objective assessment of risk. It is further shaped by their organisational structure, associated rules and resources and their objective of governance - how to exercise power, take ownership and fulfil the responsibility of risk communication (Höppner et al. 2010). On the other hand, emic perspective is hardly informed by scientific assessments. Instead it is based on the 'lived' experience of being in the 'at risk area', any access to relevant information, personal attitudes and judgements, any exposure to risk communication and any prior experience, personal needs as well as consideration of a range of issues, preferences, responsibilities, relationships, social and cultural values (Wynne 1992 cited in Willis et al. 2011, Stickler et al. 2011) and more importantly trust in the institutions relevant to governance of flood risk (Renn 2008, Winnubst 2011, Kellens 2011, Janoske et al. 2012 and Thorne et al. 2007). Therefore, not all the public living in areas at risk of flooding as identified by a flood risk communicator may accept, fully or in part, that their area or their individual property is at risk of flooding.

The acceptance of science as the instrument of institutional producers of risk-knowledge has also been critiqued (Willis et al. 2011) by contending that common and social knowledge has the same importance and the same usefulness as that of the scientific or technical as well as administrative, legal and economic knowledge (Firus et al. 2011 cited in Stickler et al. 2011). Going further, Lidskog (2008), while investigating the role of experts and lay people in the production of knowledge, highlights that the debate on who should be seen as legitimate knowledge producers not only takes place between science and citizens, but within science as well. Lidskog (2008) then contends by referring to Giddens (1994) that there is a need for a plurality of expertise where no single one can legitimately assume the role of 'expert' over 'all experts'.

The above discussion highlights the role of various knowledge claims and the associated risk perceptions. It also challenges the assumption that risk is the calculated domain of experts on which lay people must rely (Stickler et al. 2011). It shifts the focus towards socio-cultural approaches to understanding risk perceptions which can inform more useful flood risk communication strategies (Burningham et al. 2008 cited in Willis et al. 2011) by framing policies which relate the lay knowledge or emic perspective with the expert knowledge or the etic perspective (Willis et al. 2011) in order to develop shared understanding of risks. Lidskog (2008) puts it as: 'demarcations between science and lay people should be transgressed through a democratisation of science and a scientisation of the citizenry'. According to Jasanoff (2005 cited in Lidskog 2008) this can be achieved by creating spaces for deliberation and negotiation. This underscores the significance of public participation, identified in section 1.4, firstly for a two-way transfer of knowledge between the experts as the communicators and the public as the target audience in order to develop shared understanding of risks; and secondly for inclusion of public as a legitimate partner in decision making in the domain of adaptive governance of flood risk management. The process of two-way transfer of knowledge between the communicators and the public for developing shared understanding can be explained in light of a social action theory called Theory of Communicative Action which is outlined in the next section.

1.6 The Theory of Communicative Action

Habermas's Theory of Communicative Action (Habermas 1984) proposes that social actors (such as the public living in areas identified to be at risk of flooding and the

communicators who strive to communicate on flood risk with them) engage in communication with a desire to develop shared understanding on given issues or matters which are marred with controversies or different viewpoints, such as the 'knowledge claims' associated with the etic and emic perspectives discussed in the previous section. According to his theory, 'communicative action' takes place in a non-coercive environment and only the 'force of the better argument' or 'communicative rationality' prevails. To ensure development of a shared understanding through communicative action, the social actors come together with their existing knowledge but with willingness to listen to each other, they shed their individual viewpoints and if required change their positions through dialogue, creating 'new knowledge' in this process. Thus, communicative action facilitates not only transmission but also generation of shared knowledge that takes account of socio-cultural aspects of the social actors which can better support policy development. Thus, it provides the much sought after space for dialogue, deliberation and negotiation between the experts and the lay people. The Theory of Communicative Action is further discussed in Chapter 3.

Media, as the conveyers of messages, hold central position in facilitating dialogue between social actors when they engage in communicative action, be it transmission of information or two-way communication such as a conversation. The role of media is further detailed in the next section. The term messages in the context of this thesis means to present or represent certain facts, values or viewpoints about flood risk.

1.7 The role of media

The media are an integral part of communicative action and as the 'conveyers of messages' or 'information channels' or 'tools', media facilitate communication between one or many social actors engaged in communicative action where the information flow may be only in one or in both the directions. Media as the communication tool can be categorised as print media (such as newspapers and leaflets), new media/electronic media (such as radio and email) and face-to-face communications (such as a meeting).

However, comprehensive assessments of risk communication tools which can apprise selection of media for stakeholder engagement are rare (Höppner et al. 2010). Although a list of potential media for flood risk communication has been identified, (for example, Tapsell et al. 2005; Faulkner et al. 2010), little is known about their appeal or

effectiveness for flood risk communication (Höppner et al. 2010). Available research has tended to focus primarily on understanding the role of new media types in crisis communication (Macias et al. 2009; Coombs & Holladay 2009; Schultz et al. 2011). A further issue in understanding media's role as 'conveyers of messages' has been to understand the role of new media types which have emerged in the last decade or so. For example, the emergence of new mediums like the internet and mobile phones has led to the birth of new media types such as static and interactive web pages, email, blogs, social media sites (for example Twitter, Facebook), SMS (short messaging service or mobile text) and MMS (multi-media messaging service). A few theories, such as Media Richness Theory, have traditionally been at the forefront of advising on media selections. However, this theory has been thought to be unsuitable in the current climate of new media, particularly so as it has been demonstrated that it often fails if it is applied for selection of electronic or new media such as email and instant messaging (Suh 1999; Chen et al. 2008). Therefore a new theory, called Media Synchronicity Theory, which promises to address the task of media selection for risk communication has been proposed recently by Dennis et al (2008). According to Media Synchronicity Theory, a particular media's 'capabilities' measured against its specific characteristics such as 'transmission velocity' can be matched with the requirements of a particular communication tasks such as 'transmission of a short message' in order to facilitate identification of a particular media that will perform better than an alternative media.

Media Synchronicity Theory proposes that there are two aspects to a communication task: conveyance (transmission of new information to generate shared understanding or create a mental model) which is analogues to two-way communication and convergence (transmission of short messages to generate shared meaning) which is analogues to one-way communication. These have a high degree of congruence with 'raising flood risk awareness' and 'issuing flood warnings' respectively; and which as explained earlier, are the subtasks of flood risk communication between agencies and communities, ,Therefore, this theory has been selected for further research to appraise its usefulness for identifying media for flood risk communication. The role of media in risk communication and the Media Synchronicity Theory along with other media theories is further discussed in Chapter 3.

The discussion so far has highlighted the need and role of flood risk management and communication. With an overview of the many facets and related issues of flood risk communication, the following section provides an overview of flood risk communication related policies and legislation.

1.8 Policies and legislation

Together with actors and processes, governance also refers to tools such as policy, regulation and legislation that steer the development of society and contribute to society's capacity to adapt to change (Thorne et al. 2007). Since the research presented in this thesis deals with flood risk communication in Scotland, this section outlines the policies and legislation relevant to flood risk communication in Scotland. Scotland is one of the four nations comprising the United Kingdom (UK) along with England, Wales and Northern Ireland and is subject to policies and legislation applicable in the UK. However, Scotland also has powers to form and implement its own legislation. Scotland, as part of the UK is also part of the European Union and therefore is also subjected to policies and legislation relevant to the Member States of the European Union.

In the UK, guidance and commitment for developing and assessing proposals that potentially pose risks to the public have been published (H. M. Treasury 2005). Further, legislation relating to civic protection during an emergency has been enacted for the UK under the Civil Contingencies Act 2004 (CCA) which is relevant for the thesis since flooding is recognised as an emergency. Under the CCA, 'Category 1 responders' – which include Scottish Environment Protection Agency (SEPA), local authorities, police, fire service, ambulance service and health services – have the responsibility to warn, inform and provide advice to the public in relation to flooding related emergencies in Scotland. The CCA is discussed in more detail in Chapter 2.

In addition, many government and non-government agencies have published their own flood risk related policies and guidelines with the aim of improving resilience to flood risk by individuals and businesses (CIRIA 2003; Association of British Insurers 2004; Scottish Government 2004; Department for Communities and Local Government 2007; Association of British Insurers 2008; DEFRA 2008). Further, EA and SEPA have published Flood Maps to aid planning and development control but also for raising

flood risk awareness. They also have been issuing flood warnings for some areas for England and Wales and for Scotland since 2007. Another noteworthy publication in this respect in recent times has been the Pitt Report published in 2008. The Pitt Report was a review of the flooding emergency arrangements carried out following the extensive flooding in 2007 in the UK. Sir Michael Pitt carried out the review and made 92 recommendations for protecting communities from flood emergencies. The recommendations, among others, emphasised the role of advising the public, particularly by improving flood risk awareness and warning (Pitt 2008).

At the European level, the European Union Flood Risk Management Directive (2007/EC/60), which has its roots in the European Action Programme on Flood Risk Management (Falconer 2005), came into force in November 2008. This followed widespread devastation through flooding in many EU countries in 2007. The Directive's requirements are transposed into relevant laws by its 28 Member States, for example through Flood & Water Management Act 2010 in England and Wales, through The Flood Risk Management (Scotland) Act 2009 in Scotland, and in Northern Ireland through The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009. The Flood Risk Management (Scotland) Act 2009 is hereafter referred to as FRM(S) Act. Similar to the provisions of the CCA, under the FRM(S) Act, SEPA has been endowed with statutory responsibility for issuing flood warnings in Scotland.

Much of the above cited literature, except the European Union Flood Risk Management Directive concentrates on dealing with emergencies, which in the context of flood risk communication would be issuing flood warnings prior or during a flooding event. Flood warning systems are developed with the fundamental aim of increasing safety and reducing damage and loss of lives (Molinari & Handmer 2011). But it has been contended that warning systems fulfil this aim better only when the warning systems are combined with education systems (Hansson et al. 2008). It has been realised that when the public are informed of flood coping strategies they are better prepared to take adequate counter measures. Conversely, if they lack knowledge on adequate actions to take when a warning is issued, warning systems are ineffective (Molinari & Handmer 2011).

Thus, flood risk awareness is as important, if not more, as issuing flood warnings and can also be contended as a prerequisite for issuing warnings. However, this aspect of flood risk communication which has largely remained unattended by the policies and legislation, has recently gained specific recognition under the FRM(S) Act. In addition to flood warnings, the FRM(S) Act requires active and planned stakeholder engagement by SEPA and the responsible authorities, in liaison with the Scottish Government, the Scottish Flood Forum and other relevant organisations in order to raise flood risk awareness through improved awareness and access to information on flood risk. The FRM(S) Act is discussed in detail in Chapter 2.

1.9 Research rationale, aim and objectives

It has been contended that adaptive flood risk management requires changes in water governance arrangements, processes and institutions (Huitema et al. 2009 cited in Ward et al. 2012). Institutions, understood as clusters of people, rules, norms and performance, are key aspects of governance (Thynne 2008). Every type of governance arrangement has its advantages and disadvantages, and this affects its 'effectiveness' which can be summed up as 'does it work?' (Mees et al. 2012). On particular discourse on effective communication, Faulkner et al. (2007) and Faulkner et al. (2011) argue that effective communication should be viewed as a continuing process of seeking a good fit, a fit which ensures that the message is understood in the manner it was intended, of language and signs between communicating parties. This research aims at reviewing whether this is the case for flood risk communication in Scotland. The research rationale, aim and objectives are presented below after summarising the discussion so far.

Section 1.2 introduced flood risk communication as a tool for sustainable flood risk management within the framework of adaptive governance of flood risk management. Section 1.3 highlighted the public's 'right to be informed' and the central position which risk communication holds among the many stages of risk governance. It then listed the many functions and objectives which risk communication serves. Section 1.4 described how risk communication has evolved from a 'top-down' communication approach to a more inclusive 'stakeholder engagement' approach which requires establishing dialogue with a wide range of stakeholders.

Section 1.5 described how establishing dialogue with stakeholders to develop shared understanding of risk is fraught with the difficulty of converging etic and emic perceptions of risks formed and shaped by different knowledge claims. Here it should be remembered that convergence of etic and emic perspectives and literature on risk communication indicates that risk communication is 'effective' or most successful when a two way transfer of information occurs, so that lay-knowledge is related to expert-knowledge, and an assertion that 'effective' flood risk communication strategies must in part be based on an understanding of how people themselves perceive flood risk (Willis et al. 2011).

Section 1.5 also established that developing shared understanding on controversial issues or contested knowledge claims can be achieved by following the principles of a social action theory proposed by Habermas called the Theory of Communicative Action. This theory which is introduced in section 1.6 acknowledges the value of the knowledge held by all the individual social actors and advocates for dialogue, deliberation and negotiation between them.

Section 1.7 described how media as the facilitator of communication performs an important role during the process of stakeholder engagement. It also highlighted the lack of literature to guide media selection for communication tasks and then introduced the Media Synchronicity Theory.

Lastly, as mentioned in section 1.8, policies and legislation have already been developed and enacted to facilitate an adaptive governance of flood risk management which also includes flood risk communication as one of its elements. The same section provided an overview of the applicable policies and legislation which govern flood risk communication in Scotland. It was noted that these mainly cover flood warning whereas relatively less importance is given to raising flood risk awareness and establishing dialogue with the public, although it is acknowledged that the FRM(S) Act promotes these.

The above summary of the discussions presented in this chapter highlights three areas of enquiry which can benefit with additional research towards supporting implementation of the FRM(S) Act, particularly in the context of flood risk communication, these being:

i) identifying gaps between etic and emic perspectives, ii) identifying processes for bridging those gaps and, iii) appraising media selection for communication.

Defining the association of the etic and emic perspectives would require identification of the actors to whom they belong. In the context of this research, the Category 1 responders defined by the CCA are the actors to whom the etic perspective belongs but these are further reviewed (see section 2.3). These have been termed as the 'communicating agencies' for the purpose the thesis. The emic perspective has been assigned to 'communities at risk of flooding' consisting of the members of the public who are living in the areas which have been identified by the 'communicating agencies' as being at risk of flooding. The actors and their roles and responsibilities are further discussed in Chapter 2.

The second area of enquiry aims to provide a framework based on Habermas's Theory of Communicative Action to facilitate bridging of any gaps between the etic and emic perspectives whereas the third area of enquiry aims to generate useful information to facilitate selection of media that are most suitable for communication on flood risk.

Accordingly, the research aims to identify gaps in flood risk perspectives between 'communicating agencies' and 'communities at risk of flooding', and to evaluate the suitability of various media types for flood risk communication. Correspondingly, the objectives of the research are:

1. To understand community knowledge, expectations, and media usage and preferences related to flood risk communication
2. To review communication objectives and efforts of the responsible agencies
3. To identify differences between community knowledge, expectations, media usage and preferences, and the communication efforts of the responsible agencies
4. To appraise the role of Habermas's Theory of Communicative Action and Media Synchronicity Theory in supporting the development of flood risk communication strategies

5. To consider the implications of the findings for developing effective flood risk communication strategies by the relevant agencies and make appropriate recommendations

The thesis is oriented towards making a contribution to the governance literature on adaption of flood risk management, specifically on flood risk communication, by systematically mapping etic and emic perspectives on flood risk and the media employed for flood risk communication. This research, thus, is expected to contribute substantially to the field of flood risk communication as well as the literature on the role of media as a tool for flood risk communication.

1.10 Structure of the thesis

The thesis consists of nine chapters including this chapter. Chapter 2 discusses how the etic perspective of flood risk is formed and how flood risk communication is practiced in Scotland. It describes perceived sources and causes of floods, likely effects of floods and elaborates on the instruments for managing floods while introducing flood risk communication as one of the key instruments for flood risk management and the relevant governance arrangements in Scotland. It also presents how emic perspectives of flood risk are formed by referring to social theories. It then outlines the etic-emic divide and possible ways of bridging the gap in those perspectives through flood risk communication. Chapter 3 explores the factors influencing the emic perspective further and extends the deliberation on risk communication, particularly orienting it towards risk communication models, media for risk communication and risk communication strategies.

Chapter 4 describes the research design and the adopted research methodology. Studies which examine the etic and emic perspectives can be carried out by employing various social research methods such as postal surveys and interviews – one or multiple methods at a time, simultaneously or in sequence. Each social research method has its own advantages and constraints in terms of supporting research. However, it has been demonstrated that combining different research methods (also known as mixed method research) justifies the value of gathering knowledge from many sources and thus provides a fuller understanding of the research question (Fielding and Fielding 2008). This contention is also in line with the recommendation of Fielding and Moran-Ellis

(2006) who introduced the concepts of etic and emic perspectives as a useful way of thinking about research questions and data in mixed method research. This research has been carried out by employing a combination of research methods including postal surveys, one-to-one interviews and focus group discussions to gather data relevant to the emic perspective. The quantitative and qualitative analyses of the data collected by utilising these methods are presented in Chapter 5 and Chapter 6. Further, interviews of the agencies responsible for flood risk communication were also carried out to understand their (etic) perspective and their efforts related to flood risk communication. Those agencies included local authorities, SEPA, the police and fire services. Chapter 7 presents the findings from this study. Chapter 8 then summarises and discusses the key findings of the quantitative and qualitative analyses presented in Chapter 5 and Chapter 6 after subjecting them to a validation technique known as triangulation in the field of social research. It also summarises and discusses the key findings of the qualitative analysis of the interviews of the agencies responsible for flood risk communication. Finally, Chapter 9 presents the conclusions of the research, its implications and makes recommendations for improving flood risk communication strategies and for future research.

Chapter 2
Exploring the Etic/Emic Divide

2.1 Introduction

This chapter together with the next chapter form the theoretical backbone of the thesis. In line with the principal aim of the thesis which is to identify gaps in flood risk perspectives between 'communicating agencies' – the etic perspective and 'communities at risk of flooding' – the emic perspective, this chapter sets out to identify how the etic perspective of flood risk is formed in the following section, section 2.2. To do so, it focuses on how etic perspective defines flooding as a risk, identifies its sources, causes, and effects and extends the discussion towards what the agencies mean by sustainable flood risk management. It then identifies the relevant 'communicating agencies' in section 2.3 by referring to the relevant legislation – The Civil Contingencies Act 2004 and The Flood Risk Management (Scotland) Act 2009.

In order to compare and contrast the etic perspective with the emic perspective, the chapter then discusses the emic perspective by referring to two social theories, Giddens's Theory of Reflexive Modernity and Beck's Theory of Risk Society in section 2.4. Referring back to the principal aim of the thesis of identifying any gaps in these perspectives, the subsequent section, section 2.5 reviews the existing practice of flood risk communication in Scotland and makes an attempt to identify the likely need, procedures and means to bridge such gaps. Finally section 2.6 summarises the chapter.

2.2 Factors defining etic perspective of flood risk

The etic perspective, the perspective of experts or in this case of 'communicating agencies' is known to be based on an objective assessment of risk: the knowledge generated on phenomena, causality and potential harmful effects thus quantifying risk by assessing the probability of the associated factors occurring and predicting their consequences (Boholm 2003 and Figueiredo et al. 2009). It is further shaped by their organisational structure, associated rules and resources and their objective of governance, exercising power, taking ownership and fulfilling responsibility of risk communication (Höppner et al. 2010). In order to present how the etic perspective is constructed, this section draws on the literature in this field. In doing so, this section

sets out by identifying how flooding is defined as a risk, identifying the perceived sources, causes and effects of floods. It then explores the various ways in which flood risk is thought to be managed as part of a strategy for implementing sustainable flood risk management (SFRM) and concludes by identifying the position of flood risk communication within SFRM.

2.2.1 Defining flooding as a risk

According to the International Strategy for Disaster Reduction, a division of the United Nations, a 'hazard' is described as "a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation" (United Nations Environment Programme (UNEP) 2004 cited in Gavilanes-Ruiz et al. 2009). Based on an understanding of the term 'hazard' the term 'risk', with special emphasis on flooding, has been defined as below.

Risk is estimated as a function of probability, exposure and vulnerability having two components i) the probability of occurrence of a given event and ii) its negative influence. Figure 2.1 shows a diagrammatic definition of risk.

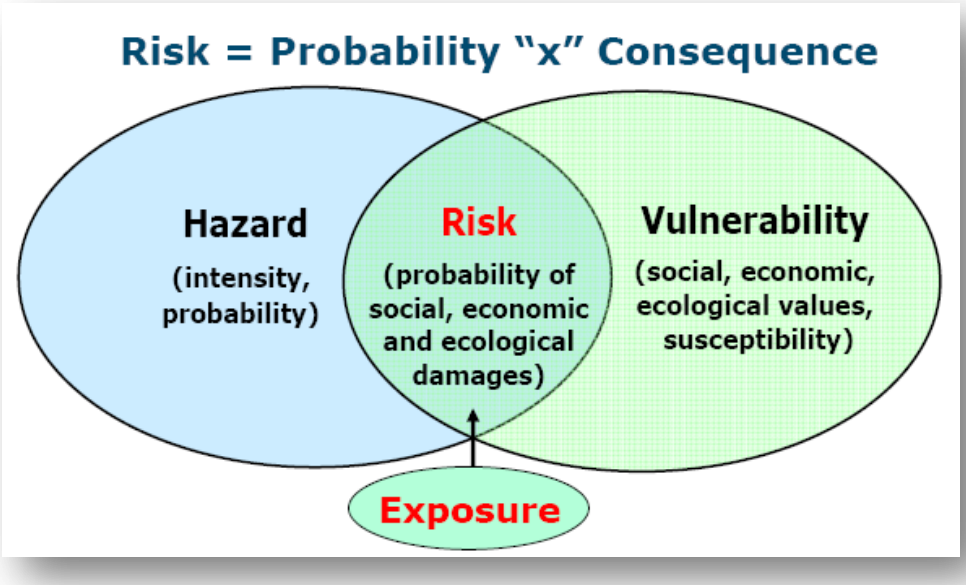

Figure 2.1: Definition of risk (Samuels 2005)

The above diagram identifies 'vulnerability' or susceptibility as a key requirement to transform a hazard into a risk. As such it should be borne in mind that floods as hazards do not always mean disaster. In the absence of exposure or vulnerability, the risk would be nil. The following discourse takes the definition of risk further by explaining how 'the experts' assess risks in order to inform their (etic) perspective.

Risk at any time, t, is the product of the probability of an event (based upon the statistical properties of the long-term event series), and the consequences of that event (Kron 2002 cited in Faulkner et al. 2010), most often expressed as:

$R_t = H_t * V_t$

where:

Rt is the risk estimate at time t,

H_t is hazard or probability which embraces distributed physical models of rainfall events, or storm surges, or floodplain inundations for event at time t, and

V_t is vulnerability or consequence (which, for floods, is often expressed in economic terms as a cost of damage).

Mathematical modelling of a range of hydrological and/or meteorological processes through time t (ΣH_t) leads to an assessment of various recurrence probabilities. Several generalised and region-specific rainfall-runoff methods and models which estimate the volume and pattern of surface runoff in time from a rainfall event are available in the literature. In some countries the models are standardised for consistency and ease of use as well as reliability of computations. For example, in the UK the Flood Estimation Handbook (Institute of Hydrology 1999) provides comprehensive guidance on various techniques for flood frequency and related flood volume estimation, particularly for surface water floods (SWFs) or pluvial floods[3] and riverine floods or fluvial floods[4]. It should be highlighted that this guidance document acknowledges that flood frequency and corresponding flood volume cannot be predicted but can only be estimated and

[3] Direct runoff over land causing local flooding in areas not previously associated with natural or manmade water courses (Collier 2009)

[4] Flooding due to inability of natural water courses to cope with excessive rainfall (Collier 2009)

therefore it emphasises that the document shall be considered as a guidance document and not a prescriptive document.

Similarly, calculating the probability of extreme sea level above the normal predicted high tide, called storm surge, involves an analysis of historical tide gauge data, wind speed and direction data as well as subjecting those data to anticipated future changes in climate (Gaslikova et al. 2011; Woodworth et al. 2011). In a further refined approach, a joint probability analysis of the hydrological, meteorological and sea level data is performed to estimate the extreme sea levels for a given location (Pugh & Vassie 1980).

With the knowledge of an estimated rainfall or flood volume and / or the likely sea levels together with the topographic information, various mathematical models with different computational approaches can be employed for estimating the extent, depth, velocity and duration for various probability flood events. The outputs of these models can be used to estimate the impact of floods upon populated areas, for development planning and to consider the implications for risk communication purposes (Pender et al. 2011; Pender 2006).

2.2.2 Sources and causes of floods

The discussions in this chapter so far have provided indicators of the sources and causes of flood risk, such as rivers, surface runoff and high rainfall. However, unfortunately the sources and causes are not limited to these only. This section, therefore, is an effort to summarise the major sources and causes of flood risk reported in the literature; and therefore which can be argued to be etic perspective in this aspect. Douglas et al. (2007) summarise the most common flood occurrences in urban areas in Europe as:

1. Blocking of regional weather systems by high pressure systems which produce widespread heavy rain over large sections of major river catchments
2. Local flooding of small streams entirely within the urban areas due to short duration - high intensity thunderstorms
3. Flash floods in hilly and mountainous regions
4. Sewer flooding either due to blocking and surcharging through manholes
5. Sudden snow melting in mountain areas due to heavy, warm spring rains
6. Groundwater flooding (Douglas et al. 2007)

The above list identifies the main causes of floodwaters to be mainly rainfall and groundwater and the main sources to be rivers or streams and sewers. Other sources of floodwaters such as sea, overland flow especially over tarmac and other hard surfaces as well as broken water mains have also been reported in the literature. It is said that flooding generally occurs through a combination of events. A brief summary of the causes of flooding in the UK as collated by the Office of the Deputy Prime Minister of UK is given below:

- Rainfall fills rivers, streams and ditches beyond their flow capacity. Floodwater overflows river banks and flood defences onto floodplains
- Coastal storms lead to overtopping and breaching of coastal flood defences due to storm surge and wave action
- Blocked or overloaded drainage ditches, drains and sewers overflow across roads, gardens and into property
- Overloaded sewers backflow into property
- Run-off from heavy rainfall events flows overland down hills and slopes
- Rain soaks into the ground raising ground water levels resulting in flooding of properties (Office of the Deputy Prime Minister 2003)

The above list identifies overtopping and breaching of flood defences in addition to the earlier list. The importance of this cause and source can be justified from the storm surge of 9 November 2007 which claimed over 2500 lives along coastal floodplains and caused considerable psychological, economic and infrastructural damage (Safecoast project team 2008). Further, occurrences of flooding due to dam failure, whether man made or naturally formed (for example due to landslides, ice blockage or blockages of watercourses at hydraulic 'pinch points' like bridges or entrances of culverts), have also been reported. The effects of floods, obviously only when these become cause of concern, are the subject matter of much deliberation and also of relevance to this research. These are discussed in the following section.

2.2.3 Effects of floods

It is said that flood losses can arise from almost any source of flooding, including tidal, fluvial as well as from surface water runoff and ground water and combinations of these (Parker et al. 2005). Flooding is argued to result in adverse or harmful effects to life, health and property as well as to public infrastructure, cultural heritage, ecological

systems, industrial and agricultural production and businesses. The scale of damage can be minor to severe depending on the depth, duration and the velocity of flood waters. Factors which are argued to contribute to the suffering of individuals affected by flooding include:

- The loss of personal belongings, particularly those of sentimental value that cannot be replaced
- the financial pressures of repairing flood damage, particularly for people who are not fully insured
- cleaning the property following flooding and residual smells
- arranging repair work
- loss of employment or a business failure
- additional costs and stress of having to live in temporary accommodation while the property is renovated and worries over the security of the empty property,
- the loss of pets
- damage to garages, garden plants / ponds, sheds and outbuildings
- potential reduction in property value
- fear of flooding happening again, etc. (Office of the Deputy Prime Minister 2003)

However, in academic literature, well-established approaches distinguish between 'direct and indirect', 'tangible and intangible' as well as 'potential and actual' damage (Molinari & Handmer 2011). These have been defined as:

- Direct losses – damage resulting from direct contact with the hazard (for example, flood damage to buildings)
- Indirect losses – losses as a consequence of the flood water but not from its direct impact (e.g. business losses due to activity disruption)
- Tangible losses – items and activities with a monetary value (e.g. buildings, livestock, etc.)
- Intangible losses – things that are not generally bought and sold (such as lives, heritage, damage to environment, personal items such as memorabilia, etc.), although values are often attributed to them for the purpose of analysis
- Potential losses – damage when no mitigation measures have been implemented (i.e. the maximum loss)

- Actual losses – concern the existence of some kinds of mitigation measures and a reduction in avoidable loss (Molinari & Handmer 2011).

Etic perspective or the experts also contend that the effects of the floods or the damage caused by floods can be reduced by avoiding exposure to floods, increasing resilience to floods and by managing floods, which is the subject matter of the following section.

2.2.4 Sustainable flood risk management

Etic perspective contends that risk management in general involves: identification of the risk and its source; an assessment of its potential for causing losses or (severity); an assessment of the probability of occurrence; thoughtful planning considering costs and benefits; continuous monitoring and adjustments; and successfully implementing a management plan.

Building on the definition of flood risk described in section 2.2.1, the linkage between flooding, risk and effects have been represented by a commonly adopted Source-Pathway- Receptor-Consequence (S-P-R-C) model as shown in Figure 2.2 below:

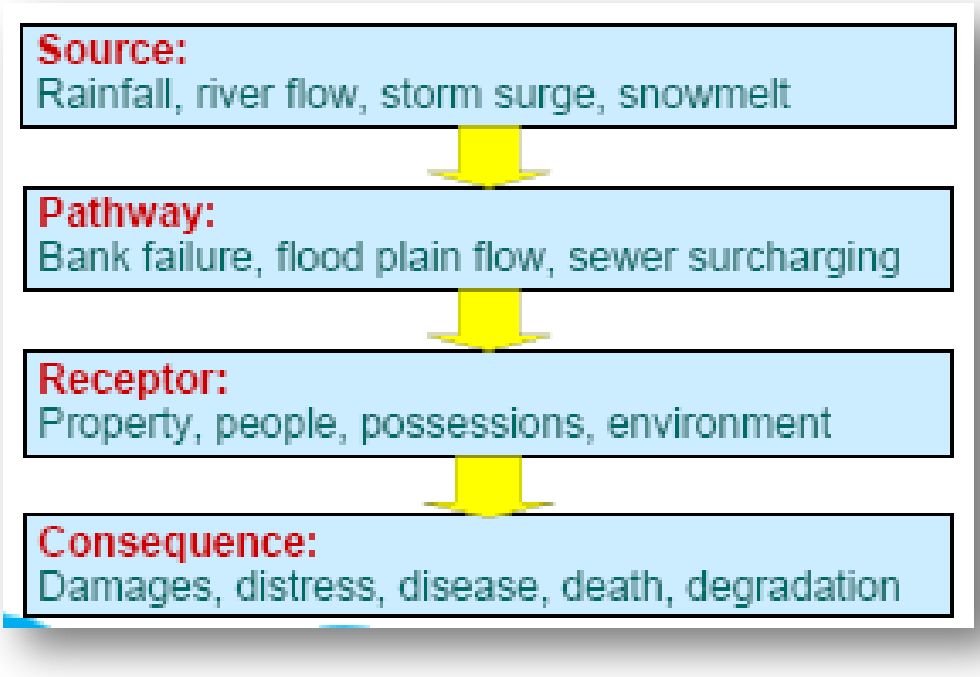

Figure 2.2: 'Source – Pathway – Receptor – Consequence' conceptual model (Samuels 2005)

From the above, it appears that to eliminate risk, the receptors need to be moved away from the pathways or be physically separated. In fact, most flood management practices in the past have largely focused on reducing flooding and the susceptibility to flood damage through a variety of structural and non-structural interventions which include source control to reduce runoff (such as permeable pavements, afforestation), storing runoff (such as detention basins, wetlands, reservoirs), increasing the capacity of the river (such as bypass channels, channel deepening or widening), separating the river and the population (such as land use control, dikes, flood-proofing, house raising), emergency management during the flood (such as flood warnings, emergency works to raise or strengthen dikes, flood-proofing, evacuation) and flood recovery (counselling, compensation or insurance) (WWF 2002).

The last two measures listed above deal especially with flood emergency, as and when it happens. However, as noted in Chapter 1 it has long been realised that complete elimination of flood risk is neither technically possible nor it is environmentally and economically feasible. Therefore, it has been emphasised that managing flood risk is a job for all the parties involved – from an individual through to the responsible agencies. It has been emphasised that communities prone to risk of flooding must adopt a sustainable flood risk management approach and adapt to flood risk through a holistic approach to management of flood risk (Fleming 2002a; Fleming 2002b). On one hand this entails shifting the responsibilities from the state to the individuals (Höppner et al. 2010) while on the other hand it represents a top-down or prescriptive form of governance.

On similar lines, it has been contended that programmes incorporating the following elements provide an effective approach for flood risk management:

1. Prevention: preventing damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas. This can be achieved by adapting future developments to the risk of flooding; and by promoting appropriate land-use, agricultural and forestry practices
2. Protection: taking measures, both structural and non-structural, to reduce the likelihood of floods and/or the impact of floods in a specific location
3. Preparedness: informing the population about flood risks and what to do in the event of a flood

4. Emergency response: developing emergency response plans in the case of a flood
5. Recovery and lessons learned: returning to normal conditions as soon as possible and mitigating both the social and economic impacts on the affected population (Samuels 2005)

The Scottish Government had also adopted in year 2004 a similar strategy called the principle of *"four As"*: *Awareness* + *Avoidance* + *Alleviation* + *Assistance* (Scottish Executive (NTAG) 2004). The importance of the *Awareness* principle was highlighted by its placement before the *Avoidance* principle, which is mostly concerned with avoiding development in the floodplains. The *Alleviation* principle is concerned with resilience and flood defences and the *Assistance* principle with emergency response and help for post-flood recovery.

As discussed in section 1.2, this adaptive shift in governance of flood risk management has been termed as sustainable flood risk management (SFRM) in Scotland. The above elicited flood risk management measures for implementing a sustainable flood risk management (SFRM) approach have broadly been categorised into structural and non-structural measures (Parker 2007 cited in Harries & Penning-Rowsell 2011; Harries & Penning-Rowsell 2010), see Figure 2.3.

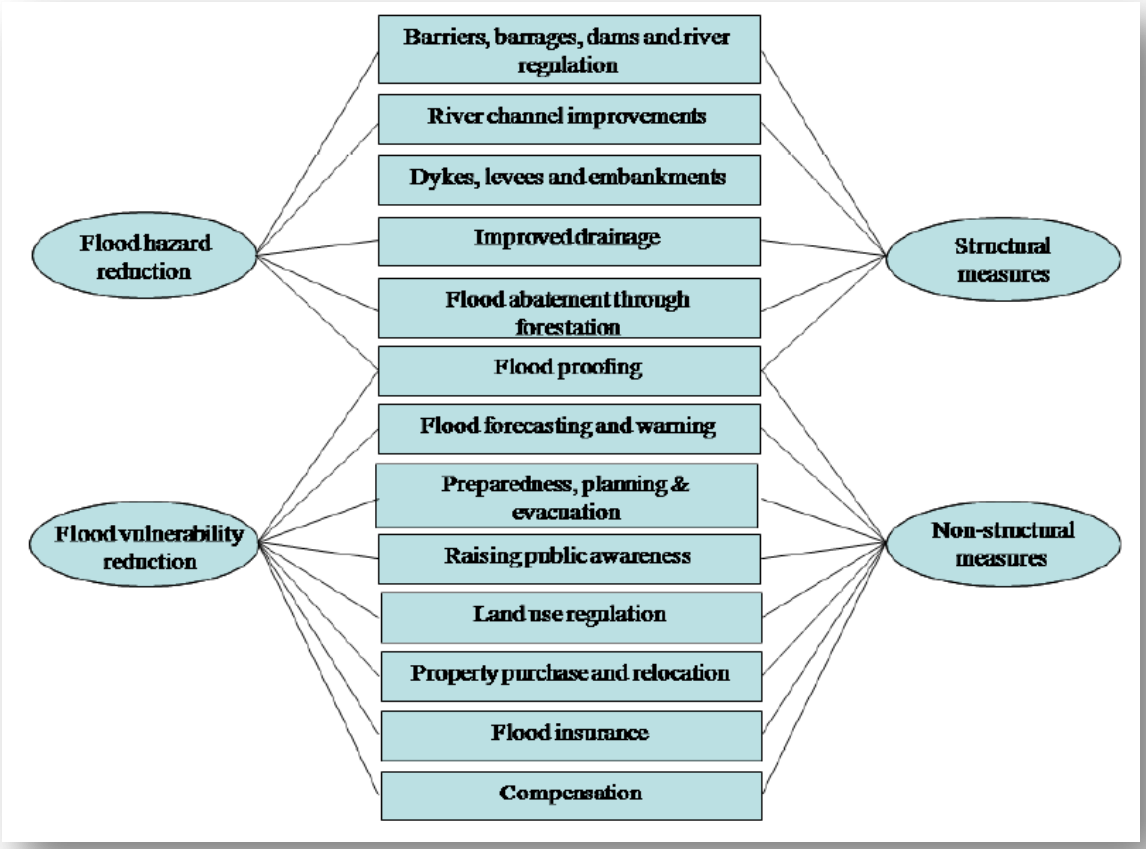

Figure 2.3: Structural and non-structural measures for flood risk management (Parker 2007 cited in Harries & Penning-Rowsell 2011; Harries & Penning-Rowsell 2010)

The non-structural flood risk management measures include preparedness planning and evacuation, land use regulation or spatial planning, homeowner adaptation through relocation and insurance against flooding, and compensation to those affected by flooding. But most importantly, they also include flood forecasting, warning and raising public awareness which relate to flood risk communication and European legislation on flood risk management (see description of EU Floods Directive in section 2.3.2).

It has been argued that the growing emphasis on SFRM, will require adoption of a framework within which the various drivers and pressures for change can be systematically evaluated (Pender et al. 2011). One such framework, Drivers, Pressures, States, Impacts, Responses (DPSIR) is shown in Figure 2.4.

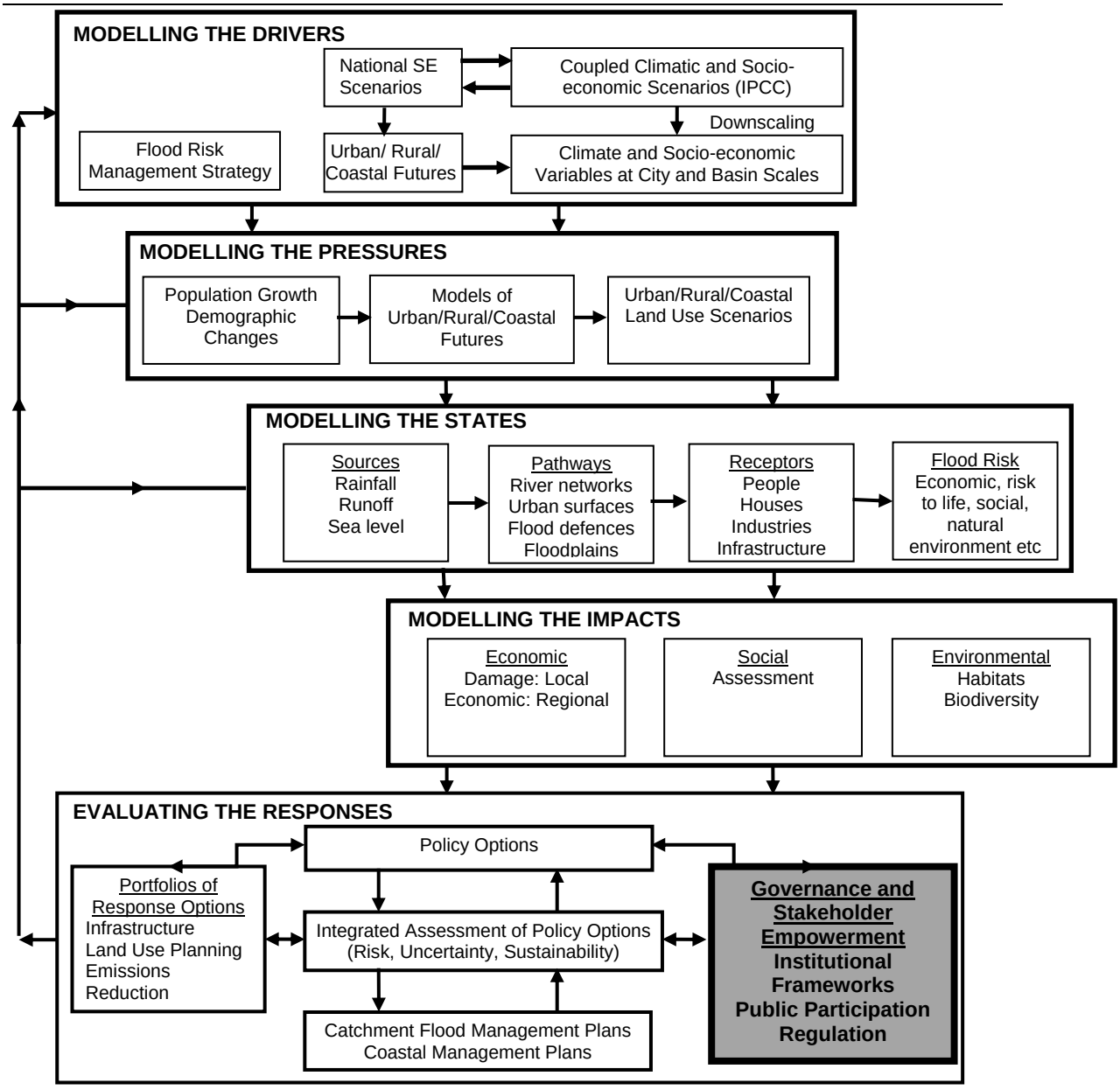

Figure 2.4: DPSIR-FRM Decision Support Framework (adapted from Wheater et al. 2007 cited in Pender et al. 2011)

As shown in the shaded box in Figure 2.4, the research aim and objectives (see section 1.9) relate to the field of "Government and Stakeholder Empowerment (institutional frameworks, public participation and regulation)" and as such relate to many actors. The following section identifies these actors and their roles relevant to flood risk communication.

2.3 Actors for flood risk communication

From the discussions so far, it may appear that the responsible agencies and the public susceptible to flood risk are the only actors who may be concerned with flood risk

communication. The flood risk management cycle depicted in Figure 2.5 may further strengthen this assumption.

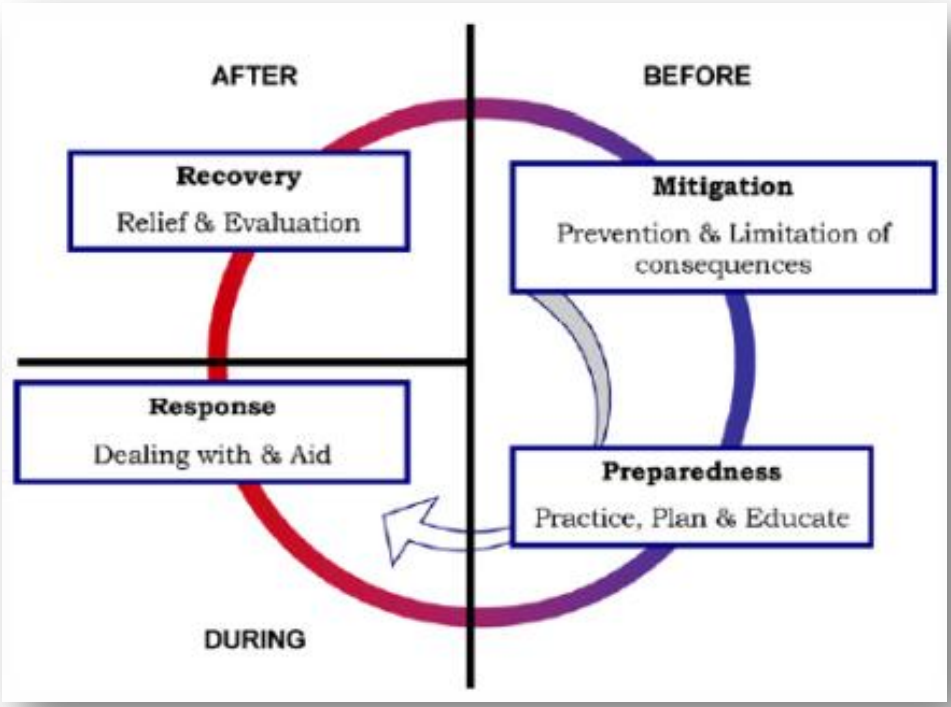

Figure 2.5: Flood risk management cycle (ten Brinke et al. 2008 cited in Schelfaut et al. 2011)

However, sustainable flood risk management does not deal with only addressing flooding emergencies and there is a larger framework (see Figure 2.3 and Figure 2.4) which encompasses the field of SFRM. A closer look revealed a different set of actors who, depending on their roles and interests, are connected to the field of flood risk communication. These are identified by Faulkner et al. 2010 as i) those at the source of information about flood science – 'the experts' (see footnote 2 on page 7) ii) non-science professionals whose work mainly involves delivering flood risk management options for society and iii) the 'public'.

Of these, the first group, 'the experts', includes scientists, meteorologists, hydrologists, flood modellers, weather and flood forecasters, economic modellers and hydraulic engineers developing asset failure models. This group communicates with the second group of non-science professionals which includes 'flood risk professionals', spatial and emergency planners, managers within the utilities, insurance agents, and possibly also science journalists (journalists may, however, at times assume the role of the public).

Both these groups have the responsibility of communicating on flood risk with the third group, public, by assuming the role of 'communicating agencies'. As such these agencies are inevitably associated with the etic perspective of flood risk. The following section will refer to the relevant legislation in Scotland to identify these agencies whereas the third group, public, is discussed below.

The third group, the 'public', often includes the public living in areas susceptible to flooding but may also include other stakeholders like businesses, community groups and flood action groups who may have a keen interest in flood risk related issues. Members of these groups may not necessarily be living in areas identified to be at risk of flooding. In most of the literature these are termed as the 'stakeholders' in the flood risk context. However, defining 'who is a stakeholder' is fraught with practical difficulties. For example, Green and Penning-Rowesell (2011 cited in Pender et al. 2011) refer to the concept of power to identify 'stakeholder' as 'those who have power to implement action or to obstruct it', and 'those who should have power'. They then refer to the EU Water Framework Directive and the Aarhus Convention (see footnote 1 on page 4) to conclude that the term 'stakeholder' in the flood risk context potentially excludes no one (also in Mostert & Junier 2009). Given the focus of the research on flood risk communication with the people living in areas identified to be at risk of flooding, the thesis limits the term 'stakeholder' to them by referring to them as 'communities at risk of flooding'. Thus, the people living in areas identified to be at risk of flooding are one of the social actors relevant to the thesis, the other being 'communicating agencies' as discussed above. The following sections discuss the Civil Contingencies Act 2004 and Flood Risk Management (Scotland) Act 2009 which identify the 'communicating agencies' in Scotland.

2.3.1 The Civil Contingencies Act 2004

The CCA provides a framework for civil protection during an emergency in the UK. Part 1, Section 1 of the CCA defines emergency as:

> '(a) an event or situation which threatens serious damage to human welfare in a place in the United Kingdom,
>
> (b) an event or situation which threatens serious damage to the environment of a place in the United Kingdom, or

(c) war, or terrorism, which threatens serious damage to the security of the United Kingdom' (C. C. Secretariat 2009).

The CCA categorises specific identified persons and bodies for emergency response as Category 1 and Category 2 responders. Part 1 and 2 of the Act's Schedule 1 list the Category 1 responders whereas Part 3 and 4 list the Category 2 responders. In Scotland the Category 1 responders are the local authorities, police, fire service, ambulance service, health services and Scottish Environment Protection Agency (SEPA) whereas the Category 2 responders are the utility companies such as water, telephone and electricity companies, transport operators and Health and Safety Executive. The Act specifies, in Part 1 Section 2, that a person or body listed in Part 1 or 2 of the Act's Schedule 1, thus only the Category 1 responders shall assess, plan and advise the public on emergencies, if an emergency is likely to occur or has occurred. These agencies, thus, have the responsibility to warn, inform and provide advice to the public in relation to flooding related emergencies in Scotland. Further, the Act, in Part 1 section 4, specifies that a body specified in paragraph 1, 2 or 13 of Schedule 1, which are local authorities, shall provide advice and assistance to the public in connection with the making of arrangements for the continuance of commercial activities by the public, in the event of an emergency. In summary, according to the CCA, local authorities, police, fire service, ambulance service, health services and Scottish Environment Protection Agency (SEPA) are the actors relevant to flood risk communication in Scotland.

2.3.2 The Flood Risk Management (Scotland) Act 2009

The Flood Risk Management Scotland (Act) 2009 or The FRM(S) Act is the result of transposition of the European Union Flood Risk Management Directive (2007/EC/60) in Scottish Law. The Directive requires that the Member States develop flood hazard maps and risk maps for incorporating into flood risk management plans. It also requires that these be available to the public and be developed by the end of 2015 and updated every six years thereafter (Hagemeier-Klose & Wagner 2009; Schelfaut et al. 2011). It also stresses flood risk communication under Article 10 (2007/EC/60) by directing the active involvement of interested parties.

The FRM(S) Act states that Scottish Ministers, SEPA and 'responsible authorities' must exercise their flood risk related functions with a view to reducing overall flood risk and, in particular, must exercise their functions so as to secure compliance with the EU

Floods Directive. 'Responsible authorities' for the purpose of The FRM(S) Act include local authorities, Scottish Water and other public bodies designated by Scottish Ministers. Further, it states, while doing so they must so far as is consistent with the purposes of the flood risk related function concerned, act with a view to raising public awareness of flood risk. The FRM(S) Act acknowledges flood warning and awareness raising as a non-structural measures for achieving flood risk management objectives. Part 5 of The FRM(S) Act provides SEPA with a new statutory framework related to flood warning in Scotland (C. C. Secretariat 2009).

The EU Flood Directive in Article 10 states that: "Member States shall encourage the active involvement of all interested parties into the production, review and updating of the flood risk management plans". This is transposed in Scotland through the statutory ministerial guidance complementing The FRM(S) Act and has been issued to SEPA, local authorities and Scottish Water. It sets out the steps to manage flooding in a sustainable manner. It establishes one of the overarching outcomes of The FRM(S) Act as:

> *'a well informed public who understand flood risk and the actions they can take to protect themselves, their property or their businesses' (The Scottish Government 2011).*

The guidance emphasises that individuals, businesses and communities can play a role in helping to reduce the risks they face. The guidance further emphasises that this must be supported though improved awareness and access to information on flood risk and on simple actions individuals and businesses can take to protect themselves and others from the impacts of flooding. Especially, it also highlights the importance of working with the communities and of stakeholder engagement. SEPA and the responsible authorities, in liaison with the Scottish Government, the Scottish Flood Forum and other relevant organisations, are expected by The FRM(S) Act to further develop and begin application of an improved national engagement and communication strategy.

Thus, both the CCA and The FRM(S) Act identify SEPA and the local authorities to be responsible for flood risk communication. In addition to the above, CCA also identifies police, fire service, ambulance service and health services; and The FRM(S) Act identifies Scottish Water as to be responsible for flood risk communication. These

agencies, as discussed in this section above, are the 'communicating agencies' and are associated with the etic perspective of flood risk.

CCA was enacted in 2004 and The FRM(S) Act was implemented partly in 2009 whereas the research presented in this thesis was planned in late 2007 when Scottish Water was not identified as one of the responsible agencies for flood risk communication. Given the academic nature of the thesis and therefore the associated constraints such as lone researcher, time and budget constraints, only SEPA and three local authorities and one agency each of police and fire services were selected for the research. Although, this excludes Scottish Water, ambulance service and health services, information related to these agencies was collected from the selected agencies.

2.4 The reflexive nature of emic perspective

The emic perspective has been assigned to the 'communities at risk of flooding' or the people living in areas identified to be at risk of flooding (see section 2.3). Having looked at how the etic perspective of flood risk is formed and having identified the 'communicating agencies', this section furthers understanding on how emic perspective of flood risk is formed. In doing so, it will build on the relevant factors identified in section 1.5 that influence the risk perceptions of individuals and of society.

Section 1.5 introduced how the emic perspective of risks is formed by referring to the various factors such as the 'lived' experience of being in the 'at risk area', any access to relevant information on risk, personal attitudes and judgements, any exposure to risk communication and any prior experience, personal needs as well as consideration of a range of issues, preferences, responsibilities, relationships, social and cultural values (Wynne 1992 cited in Willis et al. 2011, Stickler et al. 2011) and also trust in the relevant institutions (Renn 2008, Winnubst 2011, Kellens 2011, Janoske et al. 2012, Thorne et al. 2007). However, Figueiredo et al. (2009) caution that mere acceptance that perception, attitudes and actions towards risk are widely determined by social factors does not deny its objective and material existence – the risk or reality of danger of an event will still be there.

The above argument of social construction of risk can be advanced with reference to the Giddens's Theory of Reflexive Modernity and Beck's Theory of Risk Society. These

theories argue that, in modern society, termed as the 'risk society', 'risk' that is defined as the conditions that societies perceive as troublesome, is a social construct resulting from the accumulated or short-term effects of social and economic processes (Beck 1992 cited in Figueiredo et al. 2009) and that it has nothing to do with existing dangers but how society looks at it (Giddens 1991 cited in Figueiredo et al. 2009). The reference of risk being a social construct embodies in itself the notion of it being conceptualised differently across society and hence across individual members of society.

Prior to embarking on a journey of understanding Giddens's Theory of Reflexive Modernity and Beck's Theory of Risk Society, it would be useful to introduce Habermas's proposition of 'rationality' which is a characteristic of his Theory of Communicative Action, introduced in section 1.6 and discussed in more detail in section 3.3.1. According to Habermas, social actors engaged in communicative action will accept that a particular proposition, claim or statement is 'valid' or 'true' only if they are able to construct in their minds a feasible support for that proposition. This relates to 'rationality' or capacity to recognise a valid statement when tasked with inferring meaning or reaching an agreement.

Giddens's Theory of Reflexive Modernity and Beck's Theory of Risk Society highlight the roles of trust and social rationality in how societies perceive risk – how the emic perspective is formed. To explain how societies and individuals reflexively form risk perceptions, these theories are presented in the following subsections.

2.4.1 Giddens's theory of reflexive modernity

The first important step in Giddens's theory of modernity is to define structure (organisations, agencies) as 'rules-and-resources' and to suggest that rules-and-resources enable rather than restrain action. The limiting tendencies of structures are seen as necessary and helpful and as such should be viewed positively. The structures and thus the rules-and-resources are instantiated at the moment when action takes place and they therefore have an influence or binding effect on action for the duration of that moment only (Ransome 2010).

According to Giddens's theory of modernity, by using rules-and-resources actors also reproduce the conditions in which rules-and-resources are useful to them and thus also reproduce those rules-and-resources themselves which implies that the ingredients of social change and the means by which social change actually takes place must already be present in the rules-and-resources as they currently exist (change from within). Giddens sees the forces of social change a little less in terms of 'the structural forces of change' (such as changes in social infrastructure, the physical fabric and make-up of institutions and organisations) and more in terms of how social actors change their ideas, values and beliefs. It is the level of 'meaning' that attracts his attention rather than the level of institutions (Ransome 2010).

According to Giddens, social actors posses power (capacity for drawing upon the rules-and-resources around them) but the various social actors (influential and subordinates) are bound together by the various rules-and-resources at their disposal – the social actors exist in a dynamic relationship with each other. Giddens argues that social actors have at their disposal a very extensive body of knowledge about how to act and behave in the social world. This capacity, Giddens argues, gives them the 'transformative capacity' not only to act (a capacity Giddens calls agency) but to do so deliberately and intentionally and in ways that can seriously alter the world around them. According to Giddens, power is an intrinsic property of social action rather than an independent force or quantum that 'the social structure' draws upon to control individual freedoms. According to Giddens, social systems have a material existence and are embedded in time and space (we can actually see and describe them objectively) whereas social structures are largely hypothetical until they are made real at the moment when social actors make use of them (they are latent[5]) (Ransome 2010).

Giddens goes on to suggest that social theorists also have to think again about the kinds of forces that institutions exercise over or within society. In addition to the forces of capitalism, industrialism and instrumental rationalisation (instrumental rationality), he identifies three more driving forces, time and space, disembedding mechanisms and reflexivity, described below (Ransome 2010):

[5] something that was always there but not yet fully realised

The driving force of 'time and space distanciation' refers to the ways in which notions of time and space (which for practical purposes is more easily understood as 'place') are radically different in modern society compared with how they were in pre-modern society. He argues that in the modern worlds time and place are recast in much more complex and abstract ways. Technologies like air travel, global media and increased use of world-wide-web means that the range of experience is much more varied than it used to be; time and space are no longer the barriers standing in the way of experience. For example, one can relate to the experience of being in a tsunami affected area and the destructive nature of tsunamis by watching coverage on television or internet.

The second driving force Giddens proposes is the increased role of money and expert systems as 'disembedding mechanisms'. The presence of expert systems in every spear of life – which have become much more complex in form, are often embedded in technological developments and increasingly involve abstract processes and relationships – means that they tend to extend far beyond the comprehension and control of any individual social actor. For example, the numerical calculations involved in estimating how a certain property is or isn't located in a risk zone of a flooding event having certain probability or frequency is not easily comprehensible by a non-technical person.

The third driving force proposed by Giddens as 'reflexivity' proposes a double-sided or twin process by which social actors are affected by the conditions in which they act and yet are able to bring about changes in those conditions. Referring to 'reflexivity' Giddens argues that by constantly monitoring their own behaviour social actors are always altering the boundaries between structures and action. It defines how the objects and contexts of social action are constantly being changed by the knowledge actors have of those objects and contexts. In simple words, reflexivity is the property of knowledge, wherein knowledge itself is contended to be a societal property or an asset existing in the minds of individuals (Etzioni 1968 cited in Winnubst 2011). Thus, reflexivity defines the process of how certain social phenomena are bound to be directly affected by the emergence of new knowledge about them.

Giddens furthers the concept of reflexivity as: i) reflexively-organised behaviour and ii) reflexively-oriented definitions of knowledge. According to Giddens reflexivity is all about uncertainty and loss of confidence (trust) in what social actors thought they knew

for sure. He emphasises this by proposing that the notion of reflexively applied knowledge is itself something the social actors reflect upon and that it eventually affects the sense of trust social actors might have had in their ability to define what knowledge is. Giddens argues that in recent times the rate of response (changes and feedback) has speeded up significantly which has resulted in providing much more energy and momentum to the process of generating change to an extent where 'change' itself has become focus of activity. When applied to the more intimate level of personal development, the concept of reflexivity helps in developing a more robust and multidimensional perception of the social actor with relevance to that social actor's inherent characteristics. Thus, according to Giddens, reflexivity is the mechanism for the development of personal and social identity. It refers to the ways in which social actors are increasingly able to monitor their own behaviour, and to change what they do, in light of their own experiences. He then argues that through the reflexive modernisation, 'experts' become part of the knowledge pool and that individuals are able to reflect on and change the behaviour of other actors through mediated experience.

To summarise, Giddens proposes that rules-and-resources are there to enable action in the social domain and that the social actors, while maintaining their capacity to induce change in the society, pertaining to their embodied rationality, are also guided by these rules-and-resources. Giddens proposes that the process of modernisation, or the process which induce changes in society, has been driven along by time-space distanciation, disembedding mechanisms and reflexivity, and that these forces and processes have become dramatically speeded up and more intense in recent times. As a result and which is of relevance to this thesis, Giddens argues that knowledge no longer remains the preserve of the experts; the experts become part of the knowledge pool.

2.4.2 Beck's theory of risk society

Through his Theory of Risk Society, Beck argues that 'modernisation today is dissolving industrial society and another modernity is coming into being'. According to him, this radical character of reflexive modernisation (see the above subsection detailing Giddens's theory of reflexive modernity) stems from the fact that the modernising process itself becomes a primary object of reflexively organised modernisation: 'modernisation within the paths of industrial society is being replaced by modernisation of the principles of industrial society' (Beck 1992).

Further to Giddens who identifies the role of trust in relation to risk perception, Beck places 'trust' at the centre of his argument by proposing that a loss of popular faith in the scientific-technical elites of modern society, and of their capacity for making 'the right decisions' about scientific and technological progress will eventually result in the process of modernisation becoming more 'radicalised'. He argues that the increasingly contested nature of scientific-technical knowledge, the fact that the general and non-expert population is no longer prepared simply to accept what 'the experts' say, which is congruent with earlier stated concept of rationality proposed by Habermas, is what distinguishes reflexive from simple modernisation. The concepts of rationality and reflexivity are thus closely linked. He argues that the forces of social change will thus be centred around new social moments and a more general awareness of scientific fallibility among the population.

Beck's description of faith, confidence or trust in 'the experts' has a close relationship with Giddens's account of 'expert systems'. Through the presence of expert systems and as a result of time and space distanciation, for example the presence of global media and the world-wide-web, social actors become increasingly sensitive to questions of risk. He therefore argues that, this is likely to raise the threshold of trust that experts need in order to persuade social actors to carry on using the increasingly abstract and obscure expert systems the experts are developing, and thus making trust in expert systems a globalising phenomenon (Beck 1992). He therefore argues that at the social and institutional levels, and in order to maintain their own credibility, the heavily defensive professional and academic bureaucracies of the scientific-technical elites will have to hand control over the discourse of risk back to 'the people', thus replacing the old discourse in which the economic and military motivation for doing things was put ahead of a proper consideration of whether, and in what sense, something should be done, by a new discourse of democratised risk assessment and risk awareness, earlier introduced (see section 1.5) as 'democratisation of science' (Lidskog 2008).

Beck explains how risk awareness affects social action at a personal level by relying on the concept of reflexivity described earlier. He argues that self-assessment of risk implies a process of informed decision making in which non-expert social actors demand better-quality information about what affects them, and incorporate this knowledge into how they act. This also has a link with the development of rationality in the social actors. He argues that the whole of population or society changes

significantly through individual actions of social actors and that in recent times (since 1970s), the legitimacy and authority over technological debate of 'the experts' and the scientific-technical rationality has been seriously undermined by the shift towards democratised risk assessment and risk awareness, or by the social rationality which is congruent with Habermas's 'communicative rationality'. In summary, Beck highlights that trust in 'the experts' and their 'expert systems' is diminishing, and that it can be restored through democratised risk assessment and risk awareness, which inevitably includes communication between 'the expert' and 'non-expert' social actors.

Finally, Beck highlights the role of the mass media by stating that it plays a very important role in the process of reflexive modernisation – not so much by setting the agenda for which risks and hazards are being highlighted, but by providing social actors with information about these phenomena. He argues that awareness of risk is enough to get social actors thinking about which risks affect them. The media thus have two roles: i) conveyance of risk messages and ii) affect which concerns effect of communication, such as effect of television programmes on children. Of these, this thesis will discuss the media's role as conveyers of risk messages.

2.5 Bridging the gap

Having discussed how etic (see section 2.2) and emic (see section 2.4) perspectives are formed, this section addresses the question of how these perspectives can be converged in order to develop shared understanding of flood risk that meets the objectives of flood risk communication (see section 1.3). Converging the perspectives requires bridging any gaps between them. In order to do so, the practice of flood risk communication in Scotland is explored below. The following subsection then discusses the role of risk communication in bridging the gap.

2.5.1 Practice of flood risk communication in Scotland

To gain an insight into the practice of flood risk communication in Scotland at the time of the research, an information gathering activity, which constituted consultation with research supervisors, other researchers and previously motioned legislation, was carried out in the early phase of the research.

It was found that, in the academic and government circles, SEPA was recognised as the flood risk communication authority for Scotland. SEPA undertakes flood awareness raising and flood warning activities and also publishes flood risk related information on its website. In particular, in October 2006, SEPA had published The Indicative River & Coastal Flood Map (Scotland), also referred to as SEPA Flood Map. It shows areas of Scotland which are potentially at risk of 0.5% (1:200 year) or greater annual probability of flooding from either rivers or the sea or both. These maps are published principally to aid the planning and development control but also for raising flood risk awareness. SEPA also operates Floodline, a telephone dial-in and website based service which the public can access to check the areas for which flood warnings have been issued by SEPA. The researcher also came across advertisement on their website for a public flood information event and was able to gain access to their staff for detailed discussions. SEPA's website also contained some useful information for the general public and businesses on flood-proofing their properties and cleaning-up after flooding. However, it should be highlighted that, although SEPA had been carrying out some activities in this relation, the information was not well publicised – one had to search for the information to know that SEPA were carrying out flood risk communication. The other aspect of SEPA's communication activities was that none of their activities involved two-way flow of information, with the exception of some public flood information events similar to the one mentioned above. The communication activities primarily entailed overly one-way flow of information rather than the recommended or rather required two-way flow of information (see section 1.5).

In contrast to some evidence of flood risk communication by SEPA, no information on flood risk communication activities of the local authorities and police and fire services could be found, except the information that in Scotland the Strategic Coordination Group (SCG) was overseeing the multi-agency setup to undertake operations related to preparing for emergencies and for emergency response and recovery. Under this arrangement SEPA is recognised as 'the flood warning authority' in Scotland. Although reference to the preparation of Community Risk Registers was available on some websites, no further information on these could be found. This is not surprising given that a recent study (Herbane 2011) has found that almost half the local authorities in England do not provide advice on CCA on its website and similarly fail to make reference to the existence of Community Risk Registers. To the best knowledge of the researcher, no sufficiently detailed information on roles and responsibilities of various

agencies related to flood risk was available. This vagueness of roles and responsibilities is regularly cited as a barrier to the governance of adaptation (Mees et al. 2012).

Section 2.3.2 discussed the flood risk communication related provisions of The FRM(S) Act and the statutory guidance complementing it. Although these highlight the importance of working with the communities and stakeholder engagement, a further analysis reveals that it does not differ much from top-down communication. The guidance states that it aims to support an active, planned and ongoing strategy towards public participation to ensure that the public:

- are provided with accessible and comprehensible information on flood risk and flood risk management
- are aware of actions being taken by SEPA and the responsible authorities to manage flood risk
- have appropriate expectations for the level of flood protection that can be provided
- have access to information on the consequences of key flood risk management decisions
- have clear opportunities to communicate their views and priorities for flood risk management
- have confidence that their views and priorities are fully considered in decision-making processes
- understand the basis on which decisions have been made (The Scottish Government 2011 in Section 6: Engaging with Stakeholders)

It can be seen that apart from the fifth bullet point, none of the other text indicates any intention of public participation. Even the text for this bullet point suggests that there may only be opportunities to contribute, which falls short of a communication approach which involves two-way communication for generating 'new knowledge' that takes account of socio-cultural aspects of the social actors which can better support policy development. It is also noted that the text for the following bullet point, although not indicating that power will be 'shared', provides some respite that public's views and priorities will at least be 'considered', with no concrete indication of how this and other activities would be practiced. SEPA have subsequently published a document titled 'Flood Risk Management Planning in Scotland: Statement of Consultation

Arrangements'[6]. The first noteworthy feature of this document is that at the outset it mentions: 'This statement, as required under legislation, is aimed primarily at public bodies and stakeholders involved in the management of flood risk'. The document does not establish who the stakeholders other than the public bodies are or would be. It lists 'Consultative groups' and only one of which, 'Local partnerships', appears to be of relevance to general public. On membership to these groups for 'Local partnerships' it states that its membership includes 'key partners (local authorities, SEPA and Scottish Water)' and that 'membership can be widened if viewed appropriate to seek advice on a particular issue'. In summary, it rules out any possibility of consultation with the public. Although, individual members of public have responded to SEPA's consultation calls in the past, firstly, one has to find out and respond, and secondly the number of past responses have been very limited. For example, only one response from a member of public was received for this particular consultation. Secondly, the communications are planned to be essentially one-way contrary to more preferred two-way communication in view of the earlier elicitation on this topic. The second noteworthy feature of this document (both versions – the original and finalised) is that even if it is intended to describe consultation arrangements in view of the requirements of The FRM(S) Act, it has no mention of crucial or important terms in this respect which are engagement, participation and involvement. This further strengthens the top-down and one-way nature of this consultation intention.

In summary, it can be argued that at the time of the research no agency, except SEPA, carried out any flood risk communication activities and that those activities were severely constrained in their nature by being a top-down communication exercise. Although The FRM(S) Act aims at stakeholder engagement, this apparent change in approach, or rather lack thereof (as discussed above), cannot be said to be much different from the observation by Stickler et al. (2011) that scientists, technicians and persons from administration often still tend to see stakeholder participation as a tool to educate the stakeholders / the public so that these eventually understand the value and necessity of the actions proposed by the scientists / the administration and they therefore warn of losing trust (Stickler et al. 2011) in the governance arrangements. The implementation of the FRM(S) Act in its current form, therefore, does not seem to advocate change in the earlier practiced top-down approach of flood risk

[6] Available on SEPA website at http://www.sepa.org.uk/about_us/consultations/closed_consultations.aspx This was originally published for consultation in Dec 2012 and was open for comments until 22 March 2013. This has now been published in Jun 2013.

communication, and seems to still retain power with the institutions rather than sharing it with the public. It, thus, hardly supports an adaptive governance of flood risk management in Scotland. It also highlights the possibility of a divide between etic and emic perspectives and a need to find ways of dealing with it, which is the subject matter of the following subsection.

2.5.2 Need, procedures and means of risk communication

Communication in the context of risk governance refers to exchanges between policy-makers, experts, stakeholders and the general public, and among themselves. The aim of communication is to provide a better basis, also in terms of trust and social support, for responsible governance of uncertain, complex, and/or ambiguous risks (Klinke & Renn 2012, van Asselt & Renn 2011, van Asselt & Bree 2011 and Renn et al. 2011). In the context of flood risk communication relevant to this thesis, 'communicating agencies' and the 'communities at risk of flooding' are the social actors between whom communication is anticipated. Furthermore, as introduced in Chapter 1 (section 1.5), adaptive risk governance is expected to address challenges that result from a lack of knowledge and/or competing knowledge claims about risks where a risk is characterised by complexity, uncertainty and ambiguity ((Klinke & Renn 2012, van Asselt & Renn 2011, van Asselt & Bree 2011 and Renn et al. 2011), such as flood risk.

Risk communication has emerged following a need to communicate different types of risks such as health risk, risk from natural disasters including flooding, risk from industries and risk from genetically modified food, etc. (Plough & Krimsky 1987). It deals with important and ambitious objectives (Rohrmann 1992) and the extensive list (see section 1.5) demonstrates the variety of goals and objectives that can be associated with risk communication programs (Covello et al. 1986). Depending on the demands of the risk communication situation and the role of the communicator, many different means and procedures are used during a risk communication process (Severin & Tankard 1992, Rohrmann 2000). Although Fischhoff (1995) summarises the evolution of risk communication approaches starting with a clear 'top-down' or 'technocentric' one-way approach to a more recent two-way 'horizontal' or 'stakeholder engagement' approach (see section 1.4 and Table 1.1), Schelfaut et al. (2011) report the communication approaches in Europe (studied for Germany, Italy, England and Wales) to be varying from top-down approaches, especially during flood events, to clear horizontal ones which occur in a participatory manner, especially during ''floodfree''

periods. It can also be noted that Table 1.1 summarises the range of risk communication approaches, the last one being 'all of the above'. It essentially means that although there is a recent shift towards two-way communication, the one-way approach to risk communication still carries merit for certain tasks and situations.

Two of the one-way communication situations relevant to flood risk are informing and warning public on flood risk issues. It has been argued that informing the public about risks and issuing warnings can have a positive influence on information concerning the risks (Schütz & Wiedemann 2000) including raised awareness of effective preventative action against flooding. Although it has been contended that mere information of the risk does not necessarily reduce losses, informed and well-prepared communities have a greater capacity to offset harm and reduce the actual impact of flooding than lesser informed and prepared communities (Schelfaut et al. 2011). Further, it has been argued that risk assessment and communication can also address the broader range of concerns that influence evacuation decisions in emergencies (Dow & Cutter 2000), as in events of sudden floods. Thus, well designed communications policies can assist the public in rapidly adjusting behaviours and perceptions of risk, while unsuccessful policies can promote community outrage, and impede the progress of threat mitigation (Maxwell 2003) against flooding. Therefore, it has been stressed that communication should not be limited to crisis communication, but should also include the raising of awareness and preparedness (Schelfaut et al. 2011).

One-way communication tasks such as informing and warning the public described in the above paragraph involve transferring risk information. Baker (1990) suggests eight basic steps to carry out these tasks: 1) assessing the risk 2) setting goals 3) assessing the target audiences 4) assessing the socio-cultural context 5) choosing the approach 6) constructing the communications 7) implementing the risk program and 8) evaluating the effects. It can be seen that before choosing an approach considerable assessments are required which can only be established through two-way communication with the target audience to internalise public views and societal values into the process of risk analysis (Frewer 2004) and communication. Thus, it involves a bottom-up approach (of two-way communication) prior to the top-down approach (of one-way communication). According to this view, risk communication is likely to be successful if it is treated as a two-way process in which participants are considered as legitimate partners, and when people's attitudes and 'world views' regarding environment and technology are respected

(Rohrmann 2000). This can be achieved through two-way communication or stakeholder engagement by creating or providing spaces for deliberation and negotiation (Jasanoff 2005 cited in Lidskog 2008). It has been argued that in addition to assisting in establishing a communication approach, stakeholder engagement could help in building trust and understanding between the communicators and stakeholders, thus leading to integration on different levels and scales (Schelfaut et al. 2011).

However, despite the realisation of its value, it has been argued that, public participation has not been widely practised (Steinführer et al. 2007 cited in Faulkner et al. 2010) for flood risk communication. It is clearly evident from the previous subsection that this is also the case in Scotland for flood risk communication. Such non-inclusion of public participation approach for flood risk communication has been argued to have led to a considerable gap between the scientific understanding of flood risk and its management on the one hand, and the risk constructions of the people in flood-prone areas, which influence their actions and behaviours, on the other. This justifies the principal aim of the research which is to identify gaps between such understandings or perceptions. Instead, it has been argued that the public is often seen as irrelevant to the technical exercise of assessing and managing risk and to designing institutional responses (Steinführer et al. 2007 cited in Faulkner et al. 2010). This argument can also be stated to be valid for Scotland in the sense that the document titled 'Flood Risk Management Planning in Scotland: Statement of Consultation Arrangements' referred to earlier does not include facets of public participation. On performance of flood risk communication efforts in Europe, it has been found that when it comes to crisis communication, warnings do not reach the majority of the residents (Parker et al. 2009 cited in Harries & Penning-Rowsell 2011, Schelfaut et al. 2011; Faulkner et al. 2010) and about 40% of the residents living in areas identified to be at risk of flooding are unaware of the risk (Harries 2008 cited in 2011 Harries & Penning-Rowsell 2011).

Among the information generally available to the residents are flood risk maps and flood warning systems. However, it was found that residents were not satisfied with the maps due to these being large scale depictions. They were also found not to be satisfied with the warning systems as these included a water level without interpretation or indication of the consequences (Schelfaut et al. 2011). Schelfaut et al. (2011) further reported that communication in general was poor despite the availability of information

with the communicators and as a result residents claimed a lack of information related to flooding and about how to protect their properties.

The Indicative River & Coastal Flood Map (Scotland) is also a large scale depiction of flood risk areas with only the 1 in 200 year return period probability floods been mapped on a large scale (1:50,000). Further, SEPA's flood warnings are generally for a large geographic area with no reference to water levels. Therefore, it is most likely that issues similar to those mentioned by Schelfaut et al. (2011) may prevail in Scotland too. In summary, it can be stated that flood risk communication in Scotland still has a long way to go. Essentially, flood risk communication appears to be primarily top-down and one-way in contrast to a more preferred communication which includes elements of bottom-up approach such as two-way communication through public participation. Thus, it can be stated that there is a need to improve flood risk communication practice in Scotland.

The concluding part of section 1.5 suggests that Habermas's Theory of Communicative Action promotes a platform for two-way communication and as such it can facilitate in bridging gap between etic and emic perspectives. Thus, this theory has the potential to provide a framework for structuring a flood risk communication strategy. Habermas's Theory of Communicative Action is discussed in more detail in the next chapter. At this juncture it worth recalling that section 1.7 introduced the role of media in facilitating communication in both one-way and two-way communication. Media are thus an integral part of a flood risk communication strategy.

2.6 Summary

Competing knowledge claims and/or lack of knowledge were identified as the source of differing perceptions of flood risk amongst the various flood risk related social actors. This chapter elaborated on these differing perceptions and identified the social actors relevant to flood risk communication as 'communicating agencies' and 'communities at risk of flooding'. Section 2.2 discussed how the perspectives of 'communicating agencies' (etic) was formed and then identified these agencies in section 2.3. Section 2.3 also identified 'communities at risk of flooding' as being associated with the emic perspective of flood risk. Section 2.4 referred to two social theories, Giddens's Theory of Reflexive Modernity and Beck's Theory of Risk Society, to explain the reflexive nature of emic perspective. The reflexive nature of emic perspective means there is a

greater chance of it differing from the etic perspective when the communication strategy is not appropriate.

Section 2.5 revealed the gap in the etic and emic perspectives in Scotland and suggested how it can be bridged. The section first discussed the existing state of affairs on flood risk communication including its one-way and passive nature. It then analysed the need, procedures and means for bridging this gap. It contends that a gap in etic and emic perception in Scotland may exist. This section also argued that one-way communication may still be appropriate for certain situations or communication tasks, provided that such an approach is informed by a two-way communication exercise in the first place. It was highlighted that this was especially relevant when public action is expected following a flood warning, and that a well informed and aware public is better able to understand the warnings in a way which the communicating agencies expect them to understand. In summary, it highlights the importance of raising flood risk awareness and community engagement so that communities can understand issued flood warnings. It concludes by recalling the role of media as the facilitator of communication.

Chapter 3
Elements of Flood Risk Communication

3.1 Introduction

This chapter extends the theoretical background of the thesis by discussing at the outset in section 3.2 how etic perspectives of flood risk are formed. In doing so, it focuses on the most important factors identified in the literature on this topic, these being perceived susceptibility, prior exposure to hazard, prior knowledge and availability of information, socio-demographics of the communities, any prevalence of sense of community, significance of place and culture, characteristics of the messages they may receive and the role of trust in the communicator. The subsequent section, section 3.3 presents an overview of risk communication models which may be useful in guiding development of risk communication strategies that can work towards minimising any gaps in the etic and emic perspectives. In doing so it identifies Habermas's Theory of Risk Communicative Action, review of which in the context of flood risk communication is one of the theoretical aims of the research. This theory is presented and discussed in detail in a subsection in section 3.3.

While discussing the need, procedures and means of flood risk communication in section 2.5.2, Chapter 2 also highlighted the role of media as the conveyers of messages which facilitate one-way and/or two-way flow of messages. This role of media relates to the second principal aim of the research which entails evaluating suitability of various media types for flood risk communication. In order to carry out such evaluation, the theories that can explain selection of media as conveyors of messages are identified in section 3.4; these being an extensively researched and referred theory named Media Richness Theory and a relatively newly proposed theory named Media Synchronicity Theory. This section also explains why Media Synchronicity Theory was selected for this research. Evaluation of Media Synchronicity Theory for flood risk communication is also one of the objectives of the research. Section 3.4 then further elaborates on the flood risk communication tasks of media, elicited earlier on in the introduction chapter of the thesis in section 1.7 while discussing the role of media, and relates them to the two theories selected for the research: Habermas's Theory of Communicative Action and Media synchronicity Theory.

Following on from the theoretical discussion presented as described above, the chapter then proceeds towards developing a framework for flood risk communication strategy in section 3.5. Finally, section 3.6 summarises the chapter.

3.2 Factors influencing emic perspective of flood risk

The roots of the following discourse on factors affecting flood risk communication are embedded in the social theories discussed in the previous chapter and the objectives of flood risk communication. Section 1.5 and 2.4 contended that risk perspective is based on the 'lived' experience of being in the 'at risk area', any access to relevant information, personal attitudes and judgements, any exposure to risk communication and any prior experience, personal needs as well as consideration of a range of issues, preferences, responsibilities, relationships, social and cultural values (Wynne 1992 cited in Willis et al. 2011, Stickler et al. 2011) and more importantly trust in the institutions relevant to governance of flood risk (Renn 2008, Winnubst 2011, Kellens 2011, Janoske et al. 2012 and Thorne et al. 2007). Further, risk perception is known to be influenced by perceived susceptibility (Keller et al. 2006), prior exposure to hazard (Drottz-Sjöberg 2000) and availability of prior knowledge and information (Schütz & Wiedemann 2000). As argued by the Giddens Theory of Reflexive Modernity and Beck's Theory of Risk Society (see section 2.4), it is also known to be influenced by the characteristics of individuals (Sjöberg 1998) and of society. These theories also stress the significance of trust in the communicator and the value of public discourse, which are also emphasised by Kuttschreuter (2006) and Löfstedt (2005). Grothmann and Reusswig (2006) developed a socio-psychological model to explore the motivations leading to protective behaviour against flooding which also cites influence of similar factors as that identified by above cited literature. The roles of these factors are discussed in the following subsections.

3.2.1 Perceived susceptibility

It has been found that the public tends to deny flood risk (Burningham et al. 2008) and define it differently than 'the experts' (see footnote 2 on page 7) (McCarthy 2004 cited in Faulkner et al. 2010). This 'optimistic bias', the judgment that negative events are less likely to happen to oneself than to other people and thus the tendency towards denial of an imminent risk, is found to be an important barrier in developing risk perception (Spittal et al. 2005) that is realistic or closer to assessed level of risk. For

example, Spittal et al. (2005) found that people judged that they were better prepared than others and were personally less likely than others to suffer injury while simultaneously judging that their own home was more likely to be damaged than other people's homes. This optimistic bias in terms of personal risk (against an earthquake in this instance) was found to be a result of better preparedness on the part of the participants (Spittal et al. 2005). Therefore, it can be argued that, there could be reasons behind the so called 'optimistic bias' and ultimately with perceived susceptibility, such as better preparedness.

It was also found that people's perceptions of risks are informed by a number of factors that may not seem as relevant to experts involved in technical assessments of the same risk. For example, Gough (2000) found that the reasons for the differences between public perceptions of risks and 'expert'-predictions (mainly in areas of technological hazard) were that the public and the experts were concerned about different aspects of risk. In yet another example, officials placed more emphasis on planning evacuation routes and public safety measures whereas public demanded more information about the nature and severity of threat (Dow & Cutter 2000). Thus, authorities may decide only on the basis of the actual danger they perceive and neglect the risk as perceived by the population. The population may only have subjective understanding of the event, based at times on emotions, imagination or informal sources of information.

3.2.2 Prior exposure to hazard

Prior exposure to hazard is known to influence risk perception. It has been found that perceptions of risk can be systematically understood, and generally support a positive relationship between the degree of exposure to a hazard and the experience of risk in that situation (Drottz-Sjöberg 2000, Thieken et al. 2006; Zaleskiewicz et al. 2002; Heller et al. 2005 and Tunstall et al. 1994; Fielding et al. 2002 cited in Tapsell & Tunstall 2008, Fielding et al. 2005, Fielding et al. 2005a). Further, it has been found that once exposed to a hazard, a decision to use relevant forecasts and information is taken by individuals and as such, exposure to a hazard is the determinant in the decision (O'Connor et al. 2005). Harvatt et al. (2010) found that in the UK, even in high-risk areas, a lack of direct personal experience of flood events served to attenuate understanding and constrained motivation to take personal action. They concluded that weak understanding of the potential personal losses that may be incurred seems to

support perceived incapacity to act. This understanding may, however, be influenced through flood risk communication, especially by making information available and through discourse with the communities at risk.

3.2.3 Prior knowledge and availability of information

It has been found that prior knowledge (see section 1.5 for a brief discourse on knowledge and also section 2.4 on affect of rationality and reflexivity) about risk is related to the level of preparation towards responding to a risk (Hurnen & McClure 1997, Harvatt et al. 2010). It has been contended that individual and community understanding and awareness of natural hazard issues significantly affect the way communities respond to events; whilst social and cultural perspectives in addition to the technical and scientific information are also thought to be important factors to be considered (Gough 2000). Wogalter et al. (1999) stress that a distinction between knowledge and awareness is important in understanding issues of risk perception. They argue that the difference is analogous to a distinction made in cognitive psychology between short term memory (what is in consciousness or awareness) and long term memory (permanent knowledge). They argue that in the context of dealing with hazards, it is not enough to say that people know something: rather, it is critical that people be aware of (thinking about) the relevant information at the right time (Wogalter et al. 1999).

A further barrier to risk communication has been argued to be unawareness attributed to knowledge insufficiencies, which results in underestimation or overestimation of risk (Siegrist & Gutscher 2006). Further, it has been argued that as people are not capable of attending to too many things simultaneously, even though people may have knowledge of some hazard, warnings may be necessary to draw their attention to the hazard at the critical time. Warnings have been argued to serve as reminders or cues which help in accessing the information stored in one's memory and play an important role especially when there are other factors simultaneously vying for attention, (Wogalter et al. 1999) also known as overload of information (Drabek 2001). It has been established that providing information about the severity of a hazard's consequences produces greater information-seeking behaviour (Drabek 2001) which in turn is significantly related to increased perceived susceptibility (Neuwirth et al. 2000). These reinforce the

importance of one of the objective of this research, to inform strategies on raising awareness and warnings of flooding.

Further, it has been established that risk perception is stronger if exposed to risk information for longer periods (Keller et al. 2006) and that the availability of knowledge of people decreases over time (Schütz & Wiedemann 2000). As such, it can be argued that regular and continued risk communication efforts would be helpful in alleviating any presence of an optimistic bias and building up of risk awareness and socially-constructed conceptualisations of risk.

3.2.4 Socio-demographics

Drabek (2001) argues that the capacity of people to respond to environmental threats is known to be a function of not only the physical forces that affect them (floods in this instance), but also of underlying economic and social relationships which increase human vulnerability to risk. The behavioural response due to the emergent perception of risk is found to be patterned by multiple layers of social constraints among the public (Drabek 2001). Further, as people are found to be increasingly expecting very high performance from public agencies, missing a small percentage of the people affected could result in much embarrassment from governance and social perspectives, especially if that group had media or political support or if those missed constituted an identifiable group such as non-English speakers or those living in an area for which no warning provision had been made (Handmer 2000). Therefore, it has been contended that communication and participatory strategies will be considered successful only if diverse communities can be engaged as partners in the policy process (Vaughan 1995). Therefore, it has been argued that risk analysis and mitigation can be more effective when it takes into account social, demographic and socio-economic dimensions of risks (Mutton & Haque 2004). This is also known as audience segmentation (see section 1.4).

A number of socio-demographic factors like age, gender (Lindell & Whitney 2000; Heller et al. 2005), marital status (Dooley et al. 1992; Russell et al. 1995), presence of children living at home (Dooley et al. 1992; Russell et al. 1995), income (Russell et al. 1995), education (Russell et al. 1995), home ownership (Russell et al. 1995; Mulilis et al. 2000) and duration of residence at the same location (Dooley et al. 1992; Russell et

al. 1995; and Tunstall et al. 1994; Fielding et al. 2002 cited in Tapsell & Tunstall 2008), personality characteristics (Heller et al. 2005), self-efficacy (Mulilis & Lippa 1990), perceived responsibility for preparedness (Mulilis et al. 2000; Lindell & Whitney 2000) and amount of concern or preoccupation for a future catastrophe (Dooley et al. 1992; Weinstein et al. 2000) have been found to affect social constructions of risk, and therefore, how public responds to risk communications.

Studies have shown that using economic status as a grouping variable resulted in identifying a concentration of individuals with special needs. This group differed significantly from the remainder of the sample as to demographic and attitudinal characteristics, hazard knowledge and concerns, emergency preparedness, and emergency decision-making and their likelihood of taking protective actions. Respondents in the lowest income quartile reported greater restrictions in physical abilities, fewer community contacts, a heightened concern about hazards in their area, and limited resources for taking preparedness and response actions (Phillips et al. 2005).

Thus, while communicating for raising flood risk awareness, it is important to note that all of the at risk public cannot be treated as one target group. This is because in reality they are made up of many different groups with different perceptions and the most effective means of risk communication varies with circumstance (for example, an emergency situation or just an information event) and audience (Richardson et al. 2003; Handmer 2000). Groups that are different with regard to education, interest, and employment are found to differ greatly in how they perceive risks. It has been argued that explanations of such differences have not yet proceeded very far and simple notions such as variability of level of knowledge fail to account for the whole picture (Sjöberg 1998). However, there is some evidence that communication and participatory strategies are considered successful only if diverse communities can be engaged as partners in the policy process (Vaughan 1995).

Although it may not be possible to carry out risk communication tasks which suit each and every individual, it nevertheless can help in identifying distinct sets of people or groups within the target population for risk communication. Therefore, it can be argued that demographic information would help in achieving risk communication in a more targeted manner. This can be achieved by adopting a ‘strategic marketing’ or ’social

marketing' approach widely used by commercial companies for selling their products to different groups of people (see section 1.4). This concept has recently been promoted for use by public bodies for communicating with the public on environmental issues. For example, Peattie et al. (2012) describe such an approach that has successfully delivered for a Fire Service, to tackle the public service challenge of reducing the number of incidences of deliberate countryside fire-setting in certain communities. It has also been used successfully for communicating on health issues (Maibach 1993 and McDermott 2000).

In 'strategic marketing' or 'social marketing' approach, the stakeholders equate to the notion of the customer roles of initiator, information seeker, decision-maker, purchaser, consumer and evaluator (Wright et al. 2012). Wright et al. (2012) assert that there is potential for marketing concepts to make a significant contribution to the effective management of public services in contemporary society by moving away from the notion of service interaction as pure transactions towards service as a relationship that adds value. In another recent example Stickler et al. (2011) also describe the use of the concept of 'social milieus' to ensure a tailor-made participation campaign for ERA-Net CRUE project IMRA (Integrative flood risk governance approach for improvement of risk awareness) in Germany, Austria and Italy. The 'social milieus' was based upon socio-demographics of the population and was used to gain a picture of people living in the test case regions to plan information and participation activities.

3.2.5 Sense of community, place and culture

It may be noted that the research aim and objectives refer to 'communities' whereas so far references also have been made to 'public' and 'lay people'. Therefore, it is thought to be useful to explain the term 'community'. According to Gusfield (1975 in McMillan & Chavis 1986), there are two major uses - although not mutually exclusive - of the term community: the first being the territorial and geographical notion of community, for example neighbourhood, town, city and the second being the relational notion of community which is concerned with "quality of character of human relationship, without reference to location". This research revolves around the people living in areas at risk of flooding and the agencies responsible for communicating flood risk to them. This research uses the second definition to refer to these people who live in areas at risk of flooding as 'communities at risk of flooding' because they have flood

risk as a common interest or concern. This is thought to be appropriate because according to Durkheim (1964 cited in McMillan & Chavis 1986), modern society develops community around interests and skills more than locality. The Civil Contingencies Act 2004 also makes references to people at risk as 'community' and identifies 'Community Risk Registers' being a helpful tool. However, most of the risk communication literature refers simply to 'people' or 'public'.

It is a well known fact that a sense of community helps in risk communication in spreading news faster and wider in the community at risk or suppressing particular news, thus affecting effectiveness of the news as well as community response. This is explained by a risk communication framework called Social Amplification of Risk Framework (SARF) which is further discussed in section 3.3. It was found that heightened sense of community leads to better preparedness and more effective response to floods. For example during the 2000 floods in the Malabane District of Mozambique, only 14% households were informed directly by radio broadcasts. While local authorities also played an active role, it was found that 18% of the households that received official information received it through neighbours (Brouwer & Nhassengo 2006). Similarly a study of rural communities in Canada also showed that enhanced patterns of community development increased community capacity to respond to flooding (Buckland & Rahman 1999). Consistent with these findings, while evaluating the level of understanding of natural hazards (including flooding) among two remote New Zealand communities, it was observed that community structure and cohesiveness appeared to be linked to better understanding and acceptance of risk posed by natural hazards. It was further observed that smaller communities were often better prepared for emergencies (Gough 2000).

However, with regard to the issue of sense of community, contrary findings also have been reported in the literature on natural disasters which explain how social networks may suppress certain news and information or affect risk perceptions and actions. For instance, in communities close to and around volcanic activity areas in Italy, a stronger sense of community was associated with lower levels of perceived risk posed by likely eruptions or the severity of the consequences of such eruptions. These findings were found to be similar to those from some earlier studies (Davis et al. 2005) where the communities were found to be less prepared for emergencies. Further, a study in

suburban Tasmania in Australia has found that people made their choices of living in a known flood risk area within the context of more mundane but ultimately important considerations: ties to the area, the cost of living, convenience, and the general 'feel' of the suburbs. Other factors related to limited choices – financial and physical barriers or their reliance on public housing – and they lived in the suburb irrespective of how they understood the risk of flooding (Willis et al 2011). Thus, it was found that 'ties' and 'rooting in' countered any tendency to move outside the area identified to be at risk of flooding. Furthermore, it was found that some people thought of their houses as places which are innately safe and viewed society as their protector and hence were reluctant to take any protective actions (Harries 2008).

These findings are similar to the findings of a recent study in the UK which found that the risk knowledge of the people in flood risk areas was balanced against their valuing of amenities in the area and being in at-risk area as identified by 'the experts' was not 'the defining element of life'; rather, it was contextualised within people's housing history, choices (or lack thereof) and experiences (Willis et al. 2011). These findings are also in line with the arguments of Masuda and Garvin (2006) who argue that risk perception may have a bias due to place and culture.

Furthermore, some risk perception studies suggest that personal and societal level risk judgements are distinct and largely separate, and people do not necessarily draw personal implications from their general views about society. However, community involvement was found to decrease the difference people have between personal and societal level risk judgments and appeared to have a direct impact on people's personal level of concern (Park et al. 2001). This is also corroborated by Siegrist & Gutscher (2006) and Shen (2009) who have found that risk prevention behaviour was similar – and positively related to perception of flood risk – in different regions.

Summarising, the influence of associated social context on an individual's risk perception is thought to be doubtful (Sjöberg 2000). Therefore, studying whether a stronger sense of community enhances the acceptability of flood risk and influences behavioural adjustment leading to enhanced risk perception and better preparedness may be worth investigating further. Nevertheless, it has been argued that the interests of the scientific community in issuing warnings and raising awareness would be better

served by addressing the full range of ethical, social, economic, and policy issues with which the public is concerned (Priest 1995). Therefore, it has been argued that it is important that risk communication is adapted to the cultural contexts (Drottz-Sjöberg 2000) and a socio-cultural perspective can help to explain why perceptions differ between lay and 'expert' groups (Willis et al. 2011).

3.2.6 Characteristics of message

It has been argued that during disasters people are more reluctant to comply with suggested emergency measures when they are provided with vague or incomplete warning messages (Perry & Lindell 2003). Related to this it has been argued that as people drown in apparently useless and irrelevant messages they crave clarity and meaning in the multiple messages they receive, and therefore, it is the responsibility of communicators to ensure that their messages are crystal clear (D'Aprix 2005). Frewer (2004) argues that when the public want information about a risk, they prefer a clear message regarding risks and associated uncertainties, including the nature and extent of disagreements between different experts. While scientists struggle to minimise uncertainties in their predictions of flood risk which can be gleaned from the discussion on how they define flood risk (see section 2.2) and some research initiatives on communicating uncertainty; ironically, a concern that accurate information can cause panic has been found to have led officials to take actions that frustrated their own attempts to protect the public (Perry & Lindell 2003). It has been argued that the aim of informing the public should first of all be to guarantee their safety by reminding them of the elementary safety measures and secondly to prevent panic, dramatisation or rumours, which may in the long run be more harmful than the actual danger (Lalo 2000). Therefore, it has been proposed that while framing a message, it is important to strike a balance between increased awareness and preparedness and avoiding potentially increasing anxiety and feelings of disempowerment and apathy (Richardson et al. 2003). Whilst acknowledging that issuing meaningful warning messages to enable people at risk to take action is neither obvious nor easy to achieve, it has been proposed that the atomisation (reduced level of contacts with other people) and hyper-mobility (increased level of relocation, for example due to work requirements) of society is probably making it increasingly difficult to design and deliver customised warning messages to all those occupying or using a flood prone area (Handmer 2000).

It has been asserted that to improve risk communication with the public, the communicators of risk need to specify the reference class, that is, the class of events to which a single-event probability refers, for example 'compared to the flooding of 2005' in some particular locality or town or city. Probabilistic information, for example 'what does a 100 year flood mean?' is known to confuse people and to be understood differently from the communicators (Weinstein et al. 1996, Siegrist 1997, Bell 2004). Quantitative probabilities, contrary to qualitative risk statements have been argued to be confusing the public as long as the reference class is not spelt out clearly (Gigerenzer et al. 2005). This has been argued to be a governing factor, especially when technical estimates of risk are based on numerical estimates of probability and magnitude of the effect, which, as pointed out in the above paragraph, are subject to uncertainties. In such cases, it has been argued that, the general public tends to include factors such as the scale of possible events, the 'dread'[7] nature of the event, whether they feel they are being exposed voluntarily, and their judgement of the degree of scientific knowledge in the area (Gough 2000). Therefore, it has been pointed out that, if left to the individual to interpret risk information, people often concentrate on the frequency of the event rather than the potential harm it could cause. As such, it has been asserted that, to communicate risk clearly, risk probability and likely impact must be clearly communicated and understood by the target audience (Richardson et al. 2003).

Efforts to explain risk magnitude often rely on a 'risk ladder' in which exposure levels and associated risk estimates are arrayed with low levels at the bottom and high ones at the top. Such a development of risk ladders to emphasize particular risk characteristics and use for explaining risk magnitude has been supported by studies (Sandman et al. 1994). Further, in yet another study, an addition of time intervals to the odds ratios (for example 1 in 1000 year probability of occurrence in any year) was found to significantly decrease perceived threat and hence perceived need for action in a small town but in contrast such information was found not to affect response for a city (Weinstein et al. 1996). This was attributed to a hypothesis that people have difficulties dealing with probability but residents of cities may be more adapted to understanding this type of depiction. This is congruent with the well known fact that depending on how data is depicted, an identical probability statement can call forth different reactions (Kahneman et al. 1982 cited in Gross et al. 2010). Further, depicting risk information graphically as

[7] how uncontrollable, potentially catastrophic and dangerous the risk is (Boholm 1998)

opposed to numerically has been found to be a potentially useful technique for decreasing risk-taking behaviour (Stone et al. 1997).

It has been asserted that the exchange of risk information between risk managers and affected parties is frequently hampered by differences in the understanding or interpretation of many words and phrases resulting in 'mixed messages' in risk communication (Jardine & Hrudey 1997). It has also been pointed out that usage of too many buzzwords (jargon) in day to day communication sometimes catches on although more often, it just confuses people (Khodarahmi 2006).

In summary, this section emphasises the role of message content, format and clarity in communicating risk in a considered manner. This section also highlights the need to explore the socio-demographic characteristics of the communities for risk communication so that the above factors can be addressed while framing risk communication messages for them.

3.2.7 Trust

The role or rather the importance of trust in risk communication has been emphasised by the Giddens's Theory of Reflexive Modernity (see section 2.4.1) but with more emphasis by Beck through his Theory of Risk Society (see section 2.4.2). For Giddens, reflexivity is a property of knowledge, wherein knowledge itself is a societal property or an asset existing in the minds of individuals (Etzioni 1968 cited in Winnubst 2011). In elaborating his concept of reflexivity and trust, Giddens proposes that the notion of reflexively applied knowledge is itself something the social actors reflect upon together with other forces of social change (time and space, disembedding mechanisms) and that it eventually affects the sense of trust of social actors. Beck (1992) highlights the role of trust by relating it to the credibility of the experts, control over decisions on risk related issues and thus sharing of power by the people. He argues that trust in 'the experts' and their 'expert systems' is diminishing, and that it can be restored through democratised risk assessment and risk awareness, which inevitably includes communication between 'the expert' and 'non-expert' social actors, which is the focus of this research. As discussed in section 1.6, Habermas's Theory of Communicative Action places emphasis on the desire of the social actors to reach an agreement and thus an ever presence of trust that an agreement, in principle, can be reached (see section

3.3.1). Thus, trust is latent in his theory. The role of trust in the context of risk communication is thus intricately linked to the role of public participation or stakeholder engagement.

Winnubst (2011) contends that as far as uncertainty in the field of flood risk management is concerned, trust is a key factor in the extent to which citizens rely on the government and Kellens (2011) contends that when people lack knowledge (see section 1.5 for a brief discourse on knowledge and also section 2.4 and 3.2.3 on affect of rationality and reflexivity) about a hazard, their risk judgments are based on the degree to which they trust the responsible risk managers and as such, knowledge is closely related to trust. Renn and Levine (1990) define trust in the context of communication as:

"Trust in communication refers to the generalized expectancy that a message received is true and reliable and that the communicator demonstrates competence and honesty by conveying accurate, objective, and complete information".

On similar lines, Nickel & Spahn (2012) contend that trust consists of two parallel components: a judgment that a person or agency is worth relying on in a certain domain, and a set of normative expectations that s/he or the agency will behave in a certain way in that domain. Thus, it is contended that the amount of trust the public has in the communicator can make a big difference when applying risk communication models and theories (Janoske et al. 2012).

Apart from the theories which highlight the role of trust and stakeholder engagement, it has been emphasised that ensuring adequate public participation and earning trust requires the involvement of a broad range of economic and social partners, including public authorities, public or private enterprise, and the general public, and that one basic tenet of this strategy is the increased circulation of information through extended social networks (De Marchi 2000). Thus, trust is intricately linked to the process of risk communication through information dissemination and enabling dialogue with the public through discourse.

However, as the level of trust in the communicators can vary, Löfstedt (2005) calls for an analysis of the reasons behind the differing levels of trust of the public in the

communicators and then suggests a range of decisions on public discourse approaches which were proved to be effective in implementing risk management strategies. He argues that while public deliberation has a role to play it is too simplistic to consider it to be the only effective risk management tool. Therefore, he argues that the choice of the best risk management tool depends on a number of factors such as whether and why the public (in this case 'the communities at risk') does not trust the industry / regulators (in this case 'the communicators'), the uncertainty of the risk situation, the presence of charismatic individuals such as politicians and celebrities, political support, the level of public trust as assessed by the communicator, whether the communication is proactive and finally any presence of interest groups. He emphasises that with every regulatory decision there should be some form of risk communication process which is not a deliberative process in which the interest groups and the public are asked to participate actively, but rather a more top-down form of communication in which the public is informed of what is occurring. He then proposes a decision tree detailing the methodology for the building of trust of the public in the communicators. This decision tree provides steps for action depending on the known reasons of distrust, which he identifies to be lack of quality (fairness), incompetence and inefficiency, or a combination of these factors, so that the level of trust can be raised and then a top-down communication approach can be implemented. He justifies with case studies that when there is a high level of trust, top-down communication is preferred whereas public discourse or deliberation is preferred in low public trust situations.

Löfstedt (2005) contends that trust affects the public's willingness to accept risk and lack of trust in the communicator or an agency may result in the public viewing certain risks as greater than they are or losing confidence in those leading and developing policies of environmental risks (Löfstedt, 2005). Further, perceived fairness in decision making by the public tends to foster more willingness by the public to maintain or repair trust levels with risk communicators (Löfstedt, 2005).

Taking this further, Janoske et al. (2012) advise that: i) policy values should be aligned with individual / community values, ii) scepticism and questions from the public do not definitely equate to lack of trust, iii) information provided to the public must be credible, truthful and consistent iv) communicators need to know how important (and why) an issue or event is to the public and v) tailoring messages with the public prior to

the risk event establishes trust and collaboration. They, thus highlight the importance of public engagement prior to disseminating and tailoring information while discussing the role of trust in risk communication.

Section 2.5.2 discussed the importance of two-way communication prior to any one-way communication exercise. This section highlighted that low-trust situations also call for two-way communication or stakeholder engagement. Nevertheless, this section also highlighted the importance of one-way communication, to pave the way for a two-way communication exercise by increased circulation of information in order to ensure increased public participation but also for top-down communication when appropriate and relevant. The following section discusses various communication models, particularly relevant to risk communication between agencies and public.

3.3 Risk communication models

This section discusses communication models which can support flood risk communication, both the one-way or top-down communication and two-way or horizontal communication. Communication models can be categorised into: i) basic models, ii) models describing personal influence, diffusion and short-term effects on individuals, iii) models describing effects on culture and society, iv) audience centred models, and v) models describing media organisation, election and production (McQuail and Windhal 1993). However, McQuail and Windhal (1993) acknowledge that models will have to be adapted to the changing communication realities of society and the above list may not therefore be considered to be comprehensive. The following discussion on risk communication models, therefore, begins with the classic theory of communication.

The classic theory of communication, which falls under the basic category listed above, proposed by Shannon and Weaver (1949) states that the transmission of a message begins with a *source* (the message sender) who creates a *message* for transmission. The source uses a *transmitter* (software and/or hardware) to encode or translate the message into a signal (e.g. text, voice, and video) that is sent over a communication *channel* (medium). The channel carries the signal to a *receiver* (software and/or hardware) which is used by the *destination* (recipient) to decode or convert the signal back into the message (Dennis et al. 2008). Thus, communication implies a sender, a message, a

channel, a receiver and also a relationship between sender and receiver, an effect, a context in which communication occurs and a range of things to which 'messages' refer. Communication can be any or all of: an action on others, an interaction with others and a reaction to others (McQuail & Windahl 1993). This is presented as a conceptual diagram in Figure 3.1.

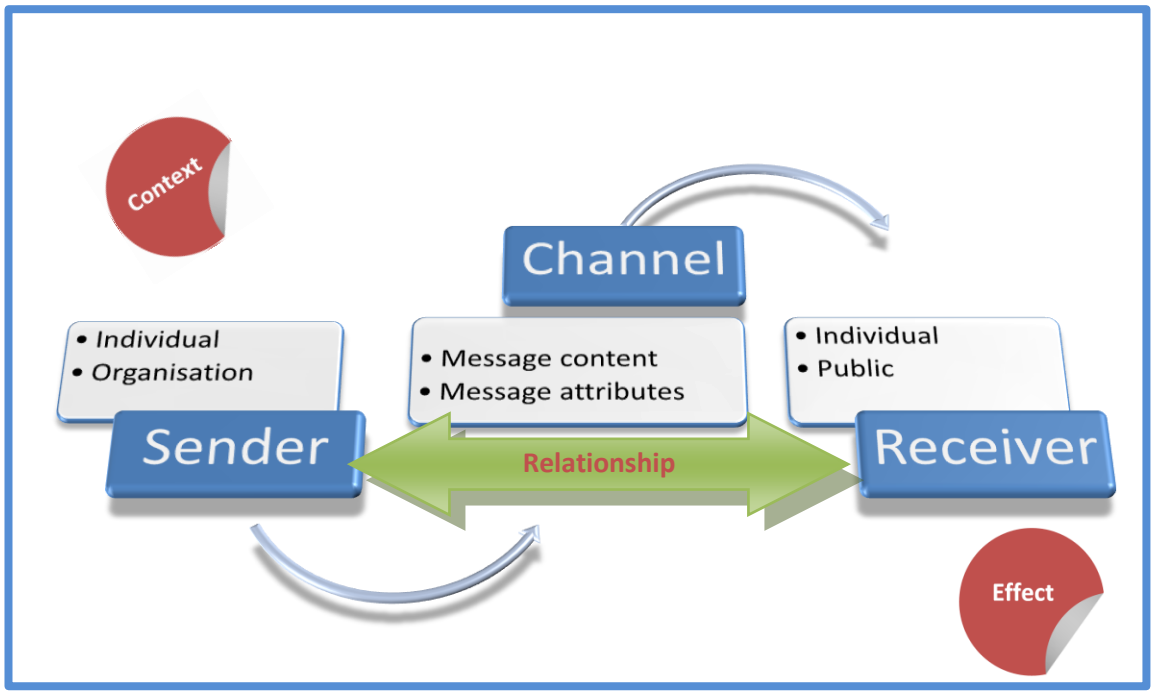

Figure 3.1: Concept diagram of communication process based on McQuail & Windahl (1993)

The above model identifies the role of channels or media which carry the signal containing message. These information intermediaries or risk communication channels can vary greatly in their presentation of risks, both within and across intermediary types and formats of communications. Therefore, it has been argued that, this makes the public's perception of risk dependent on the type of intermediary they attend to and believe (for example, a friend, a government officer) and format (for example, a radio broadcast), as well as their own expertise and experience in the particular area of concern. Another model, Social Amplification of Risk Framework (SARF) explains the influence of these factors on 'risk communication signals' by explaining why some people amplify[8], and others attenuate[9] risks in locally contentious environmental

[8] Amplification refers to the process of framing risk messages and transmitting them to the public which generates significant public interest or *media-hype* (Petts et al. 2001; Pidgeon & R. E. Kasperson 2003 in Vasterman 2005). Literally, amplification means a process which extends range or reach of something, for example sound.

debates (Masuda & Garvin 2006). It contends that risk communication is a cultural process that operates in 'place' (Kasperson et al. 1988) and patterns of risk perceptions are mediated by attachments to a place where people live and work (Masuda & Garvin 2006).

According to Social Amplification of Risk Framework (SARF), psychological, social, and institutional factors influence risk perceptions and behaviour through a network of socially mediated communication channels. These communication channels can be either formal such as the media, public relations campaigns and community meetings; or informal such as word-of-mouth interaction within social networks. Of these, the media has been seen to be influential in risk perceptions and therefore has received particular attention. But, it has been contended that in local risk debates many informal sources, including individual citizens or activist groups and institutions, can act as crucial amplification or attenuation stations. These informal sources operate within communication channels embedded in everyday life, receiving and sending risk signals that in turn influence the risk perceptions of others (Flynn et al. 2001). Since information-processing strategies that govern how people process information substantially mediate the relationship between local news media and public perceptions, it has been argued that people not only acquire information from the news media but are also capable of processing the information in different ways (Fleming et al. 2006).

Since the SARF was created in 1988, it has been both further developed and also critiqued for its static conception of communication, lack of attention towards how key actors use the media, lack of systematic attention towards the media as an amplification station and simplistic assumptions of how the media operate as an amplification station. The usefulness of the SARF in understanding the media's role in risk communication has also been studied. It was concluded that these critiques are more a consequence of how researchers have used the SARF rather than a fault of the SARF itself (Bakir 2005). Further research showed how risk communication is a cultural process that operates in specific locations or 'places'. As discussed in section 3.2.5, the use of SARF identified distinct patterns of risk perceptions that were mediated by place attachments (Masuda & Garvin 2006), and SARF has been argued to have played a key

[9] Attenuation is the antonym of amplification which in relation to the thesis refers to suppression of some specific news

role in bridging the gap between risk perception research and social context (Masuda & Garvin 2006).

In summary, it can be contended that Shannon and Weaver's basic model focuses on communication in the technical sense whereas SARF can be seen as a development of Shannon and Weaver's model in which distortion of risk messages is attributed to 'noise' in the channelling of risk 'signals' by various socially induced attenuation or amplification of the signal (Boholm 2008). Further, it can be noted that Shannon and Weaver's basic model, SARF or the other models listed by McQuail and Windhal (1993) do not contain elements which can support two-way communication by creating spaces for deliberation and negotiation (Jasanoff 2005 cited in Lidskog 2008) as proposed by Habermas's Theory of Communicative Action (see section 1.5, 1.6 and 2.5.2). Therefore, Habermas's Theory of Communicative Action has recently been advocated as an alternative to Shannon and Weaver's model and SARF (Boholm 2008). References to discussions in the previous chapters would confirm that it can be applied to provide a platform for the creation of shared knowledge, support development of shared meaning and knowledge, and hence has been proposed as a tool for bridging the gap between etic and emic perspectives, which is the principal aim of the research. The theory is further discussed in the following subsection.

3.3.1 Habermas's Theory of Communicative Action

Habermas's Theory of Communicative Action (Habermas 1984) belongs to the social theories which deal with theories of social action. Prior to introducing his theory in 1984, Habermas described four theories of social action, then already widely used, these being: Teleological action, Strategic action, Normatively regulated action and Dramaturgical action. Habermas then proposed the Theory of Communicative Action where dialogue between social actors is fundamentally shaped by their mutual desire to reach understanding and agreement. His theory presupposes that the social actors involved in communication already agree with the terms and concepts that are vital for the communication to succeed. According to him, the very logic of communication is that agreement can be reached. He argues that dialogue fails if the participating social actors have different ideas of what is being discussed and even how 'agreement' is being defined whereas it succeeds when the actors are motivated to reach agreement and

believe that an agreement, in principle, can be reached. The principles of making such agreements are embedded in the norms, values and beliefs of the society.

He proposes various relationships present within the domain of social action as: object-subject relationship, individual-society relationship and context-meaning relationship. By object-subject relationship, he proposes that social actors witness the exterior world around them (congruent with etic perspective) and often treat events 'out there' as separate from themselves, but simultaneously they are also and quite fundamentally part of those events (congruent with emic perspective). So, he argues that the distinction of objects and subjects as separate entities is misleading – objects can be subjects and vice-versa or human beings are also objects despite their capacity for subjective awareness. Similar to the above, he proposes that the individual-society relationship too perpetually fluctuates between subjective and objective states.

He argues that in the objective dimension, society provides a concrete context that regulates the forms of social action that can take place within the community by providing essential resources. Similar to Giddens's concept of rules and resources, Habermas proposes that society is governed by rules that permit some actions whilst inhibiting others, thus rules act simultaneously as an enabler as well as an objector of the actions that can take place within society. By meaning-context relationship, Habermas proposes that meaning is something that arises out of communicative action and it is not a separate thing which the social actors try to agree about by making formal propositions, which can be judged as true or false, about external objects in the world. He argues that the standards of meaning and rightness are determined by the participating social actors within the communicative situation and in light of the circumstances and contexts where it takes place. The meanings or agreements are therefore negotiable rather than fixed. Going further, he argues that there is a very close connection between communicative action and meaning, both of which are grounded in and profoundly shaped by the practical outcomes the various social actors involved in the communication wish to achieve. For Habermas, all three kinds of relations, subject-object, individual-society and meaning-practical outcomes, are embedded within the context where they occur and these tend to have temporary quality.

According to Habermas, social actors engaged in communicative action will accept that a particular proposition, claim or statement is 'valid' or 'true' only if they are able to construct in their minds feasible support for that proposition. This characteristic of his Theory of Communicative Action relates to 'rationality' or capacity to recognise a valid statement when tasked with inferring meaning or reaching an agreement, or in Habermas's words the "consensus-bringing force of argumentative speech". The actors engage with communicative action with each other and progress towards negotiated agreements by drawing on the accumulated experience they already have and in this process create shared knowledge (see section 1.5). In summary, according to Habermas, validity is not something that every social actor has to make up from scratch with every instance of communicative action.

Habermas argues that communicative action plays a major role in establishing social order by drawing upon and by consolidating agreement about underlying social norms, values and beliefs which do not exist in a pure, perpetual or abstract form but rather are evident as regulatory forces that shape social functions. Prior to Habermas, instrumental rationality, which proposes that an action is rational when it enables specified objectives to be achieved, was agreed to be the driving force in modern society. However, Habermas goes beyond by proposing that alongside instrumental rationality, there exists communicative rationality which underlines the desire for social improvement. Whereas instrumental rationality is very much a functional form of rationality aimed at solving fairly specific operational and practical difficulties and is thus tied to systems such as organisations and institutions or around 'formal' i.e. procedural questions, communicative rationality is oriented around 'substantive' questions that are to do with the much more general objectives and intentions social actors hope to achieve. Habermas terms the realm of communicative rationality where debates over substantive issues take place or the domain where social integration takes place as the 'lifeworld'. For Habermas, social development and individual development are interdependent and much depends on the kind of balance that is struck between these two realms. He argues that maintaining a productive balance between the system and lifeworld – between individual's interests, termed instrumental rationality and social interests, termed communicative rationality – is a prerequisite for social order (Ransome 2010).

Habermas views the presence of system-centred instrumental rational actions as the 'colonisation of the lifeworld'. At the individual social actor level (micro-level), 'colonisation of the lifeworld' takes away the autonomy the actor needs to ensure a feeling of being in control of one's life. At the society level (broad or macro), 'colonisation of the lifeworld' represents a compression of the range and depth of communicative action, and along with it a contraction of the means social actors have of debating and negotiating their agreements about the substantive questions that face them (Ransome 2010).

On the capacity of self transformation of society, termed as 'reflexivity' in other theories of social action such as in the Theory of Reflexive Modernity by Giddens and Beck's Theory of Risk Society, Habermas describes public sphere being an intellectual, political and cultural domain in which established ideas can be challenged and new ones explored. Habermas regards it to be a key forum for communicative action and argues for its reinvigoration as a necessary prerequisite for continuing the self-transformation of modern society. Habermas proposes that the forces of social change come from within the already-existing institutions and practices of society. That is, the criticisms emerging from within a particular paradigm or cultural tradition demonstrate the capacity of the paradigm to turn its own critical and exploratory power against itself. He argues that the most valid kind of criticisms emerge from within that which is in the process of transforming itself (Ransome 2010).

Related to two-way communication or stakeholder engagement and the spaces for deliberation and negotiation (Jasanoff 2005 cited in Lidskog 2008), Habermas contends that creating right conditions for communicative action to take place through discourse is important because, according to him, the outcomes of negotiations between participants are profoundly affected by the quality of the speech situation. He proposes three kinds of discourse as:

i) Theoretical discourse, which is concerned with truthfulness - the factual or empirical accuracy of the statement. It is aligned with cognitive use of language and describes the objective world of material objects

ii) Moral-practical discourse, which refers to the rightness of the statement - it being in agreement with an underlying social norm. It is aligned with interactive use of language and figures mostly in interpersonal relations, and
iii) Aesthetic discourse, which refers to the sincerity - underlying good faith of the validity claim. It is aligned with expressive use of language and refers to subjective states of mind and feelings.

Referring back to rationality as the "consensus-bringing force of argumentative speech" in relation to the validity claim of a proposition by a social actor which can be addressed through the above types of discourse, it is vital to point out the important attribute Habermas specifies for argumentative speech or discourse: the force of better argument. Habermas specifies that a validity claim must be tested 'with reasons, and only with reasons'. Thus, Habermas rules out any other forces, such as bribe, coercion, threats, dogma, domination or manipulation, in order to reach consensus or shared understanding on contested knowledge claims.

Considering the above mentioned condition of 'the force of better argument' together with the attributes of the three kinds of discourse listed above, Habermas's Theory of Communicative Rationality means that social actors should interact with one another in a 'dialogue-mode', rather than with an aim of conflict-resolution or negotiation or debate. It also does not mean 'collaboration' wherein the differences are accepted and ways to work together are explored. Entering into a dialogue means equality and the absence of coercive influences, exclusion of a 'desire of winning' (such as in debates) at the expense of others, and empathy towards others, and an open minded approach to reach mutual understanding (Winnubst 2011).

In summary, according to Habermas, communication between social actors is fundamentally shaped by their mutual desire to reach understanding or agreement wherein the principles of making such agreements are embedded in the norms, values and beliefs of the society. Habermas contends that a proposition or claim by a social actor should pass the test of 'rationality' and 'reflexivity' for it to be recognised as a valid statement; and that communicative action as a non-coercive discourse facilitates development of shared understanding between actors. Thus, communicative action provides the space for social actors to interact in order to reach agreements and develop

shared understanding on a range of issues through information transfer using various media which is the subject matter of the next section.

3.4 Media for risk communication

Media are one of the channels for risk communication which can be used for interpersonal or mass communication of hazard and risk messages. Section 1.7 introduced the role of media as the 'conveyers of messages' or 'information channels' or 'tools' i.e. as a fairly uncritical one-way process of passing information on in a one-way or two-way communication. The traditional technological devices or tools for communication are well known to be print media like newspapers, magazines and electronic media like radio and television. However, with the arrival of the 'communication revolution' new media like the internet, mobile phone and interactive television have become more important. These also have given birth to new media forms like static and interactive web pages, email, blogs, social media sites (for example Twitter, Facebook), SMS and MMS. Pertaining to this media revolution, the boundary between mass media and personal media is no longer a clear boundary.

A frequently cited definition of mass communication is provided by Janowitz as "the institutions and techniques by which specialised groups employ technological devices (press, radio, films, etc.) to disseminate symbolic content to large, heterogeneous and widely dispersed audiences" (McQuail & Windahl 1993). It has been suggested that mass media provides real-time information to the public while monitoring public conditions and reactions to agency decisions and that professionals or the 'experts' provide governments with knowledge while serving as filters for understanding more complex scientific issues both for the media and the public at large (Maxwell 2003). Thus, risk communication channels play a significant role during emergencies, not only as a means for public officials to communicate with public, but also as a method of providing government agents with information about local conditions and knowledge in areas outside their immediate expertise (Maxwell 2003).

Thus, mass media are an integral part of any communication exercise. The role of mass media for risk communication has been well emphasised by Beck (1992) who states that it plays a very important role in the process of reflexive modernisation by providing

social actors with information about risks and hazards. He argues that awareness of risk is enough to get social actors thinking about which risks affect them.

Further, it has been contended that media effects are largely known to be long-term and indirect and that messages are actively interpreted by audience members (Priest 1995). Further, media use, exposure and attention are known to relate to factors such as demographics (age gender, etc.) and personal experience on risk judgments in an environment where media are selectively attended to due to the influences of outside factors. There is some evidence that media use retains a degree of influence after controlling for these latter factors (Slater & Rasinski 2005). However, although many take the media's influence for granted, there is also evidence that even for heavy media users, media are probably not a strong causal factor in (especially not personal) risk perception (Waahlberg & Sjöberg 2000). It has also been contended that risk perception may be affected by the media via availability: more information gives a stronger effect, but that the effects are lessened by impersonal impact: general risk perception is more easily changed than personal risk perception (Waahlberg & Sjöberg 2000). For example, people may accept that their area is at risk of flooding but they may think that it is not going to affect their property. Thus, conflicting findings about the role of media use on risk perception and the likelihood of taking preventative action have been reported in the literature.

The effects of communication can be analysed from the media practitioners' and the audience's points of view. According to Severin & Tankard (1992) the intended effect a media practitioner expects is to achieve a behaviour change. However, they propose that, the audience member is more likely to be concerned about the uses of mass media than about its effects and probably thinks the media is to be used for a number of purposes which may vary from entertainment, leisure and relaxation to obtaining news and warnings. Therefore, it has been argued that the effects of mass media on the public can be considerably different from those intended by the communicators and the investigation of the effects should be done in the most careful and rigorous way. It has been asserted that the answers to the questions about these effects should come from communication theorists and researchers and not just from arguments by people and groups who have become adversaries in a public controversy (Severin & Tankard 1992). As such, it can be argued that, knowing which media is best suited to specific

communication needs is the key to ensuring that the message is received and understood effectively. It has been emphasised that risk communication managers and professionals are obliged to choose those media that are most appropriate to the audience's needs (D'Aprix 2005). This thesis especially focuses on this aspect of media for flood risk communication.

Several theories which explain the suitability of particular media for a given communication task can be found in the literature (Rubin 2002 cited in Wei, 2008; Ball Rokeach and DeFluer, 1976 cited in Gordon, 2009; Lowrey, 2004 cited in Gordon, 2009). Many of these theories focus solely on the needs and goals and affects of the media on the audience, which are limited for the purposes of the current research. In contrast, Media Richness Theory and Media Synchronicity Theory, discussed below in sections 3.4.1 and 3.4.2, concentrate on the attributes of media itself which is thought to be more relevant to the research as these may help in identifying specific media for flood risk communication. The Media Richness Theory is discussed in the next subsection.

3.4.1 Media Richness Theory

Media Richness Theory is known to be among the most frequently cited theories in the literature on the selection of media for a communication task performance (Suh 1999). It proposes that 'media richness' or a particular media's ability to convey richness of information is dependent on attributes of that media such as feedback capability, availability of non-verbal cues, language variety and personal focus. In this context face-to-face communication is considered to be the richest media of all as it allows rapid mutual feedback, permits the simultaneous communication of multiple cues (for example body language, facial expression and tone of voice), uses high-variety natural language and conveys emotion (Suh 1999; Chen et al. 2008). Depending on the richness of the media, a media is categorised as a rich media or a lean media. Email is an example of a lean media as email provides feedback, but the response time is difficult to control; non-verbal cues are usually absent; and because email may be addressed to a large number of recipients, it usually lacks personal attention (Chen et al. 2008). Lean media are recommended for communicating an unequivocal message (such as transmission of a short message containing information only, for example, 20 mm of rain is expected tomorrow) whereas rich media is recommended to solve an equivocal

situation such as negotiation for gaining consent of landowners for a flood prevention scheme (Suh 1999).

Although Media Richness Theory has been largely able to explain the media choice when only the traditional media were considered, it has been demonstrated that it often fails if it is applied for selection of electronic or new media such as email and instant messaging (Suh 1999; Chen et al. 2008). A further criticism of Media Richness Theory has been that it constrains itself into 'communication task-media technology fit'[10] realm and ignores context and situational factors such as availability, accessibility, experience with the media, personal preference and social influence (Richardson & Smith 2007; Palvia et al. 2011).

A relatively recent theory, proposed by Dennis et al. in 2008 called Media Synchronicity Theory has been viewed as a promising successor of Media Richness Theory in that it is argued to move beyond its constraints and focuses more on context driven media selection for improved communication performance. It was proposed to identify media which would prove most effective for a given communication task (Dennis et al. 2008), one of the main aims of the current research. The concern of the theory with the context of communication also enhances its relevance for the current research. Further, a literature search for Media Synchronicity Theory in the flood risk communication context found that it had been used by only one study - by Muhren in 2011. Therefore, this research will contribute to the literature on this theory. The Media Synchronicity Theory is presented in detail in the following subsection.

3.4.2 Media Synchronicity Theory

Media Synchronicity Theory defines communication as "the development of shared understanding" in the context of a given communication task; media synchronicity as "the extent to which the capabilities of a communication medium enable individuals to achieve synchronicity" where synchronicity is defined as "a state in which individuals are working together at the same time with a common focus". This has a high degree of congruence with Habermas's proposition that the very logic of communication is that agreement can be reached and that social actors engage in communication with a mutual desire to reach understanding and agreement. The theory argues that "*communication*

[10] Where a media is chosen for a communication task based on only the technical aspects of the media

performance comes from the matching of media *capabilities* to the *communication processes* required to accomplish a task, not to the overall task itself". It proposes that media synchronicity may differ from person to person and over time (Dennis et al. 2008).

According to Media Synchronicity Theory, there are two aspects to the process of accomplishing a communication task: conveyance and convergence. Conveyance is the transmission of a diversity of new information – as much new, relevant information as needed – to enable the receiver to create and revise a mental model or to generate understanding. The information can be delivered in variety of formats, be divergent and it is not necessary that all the participants must agree on the meaning of the information or that they must focus on the same information at the same time. This aspect of the communication process would often require substantial time of the recipients of the information to process the potentially large volume of information received in a variety of formats and then build mental models or make sense of the information (Dennis et al. 1998). Convergence is the development of a shared meaning to information as opposed to development of a mental model based on new information. It requires rapid transmission of small quantities of pre-processed information so that individuals can interpret the information and develop common understanding by referring to the mental model developed at the conveyance stage of the communication task (Dennis et al. 1998). The theory argues that using media low in synchronicity can negatively impact convergence process as such media may increase delays that impede the development of shared meaning. These communication process characteristics are summarised in Table 3.1.

Table 3.1: Communication process characteristics (Dennis et al. 2008)

Communication process	Information transmission characteristics	Information processing characteristics	Media synchronicity required
Conveyance	Higher Quality Various Formats Multiple Sources	Retrospective Slower	Lower
Convergence	Lower Quality Specific Format Specific Sources Faster	Verification Adjustment Negotiation Faster	Higher

It has been argued that proper media selection comes only when the information transmission and processing needs of the communication process are in sync with the information transmission and processing capabilities of the media itself (Palvia et al. 2011). In line with this, the Media Synchronicity Theory argues that the fit of capabilities of media to the needs of the communication task influence the appropriation and use of media, which in turn influence communication performance. This means that to be a media of high performance and hence a media of choice, the selected media should facilitate bridging the information gap between sender and receiver within a time as envisaged by the sender.

In order to evaluate the performance of media for a given communication task, the Media Synchronicity Theory focuses on the ability of media to support synchronicity which it derives by referring to the Shannon Weaver's (1949) classic theory of communication mentioned in section 3.3. It identifies five capabilities of media:

Transmission capabilities

i) Symbol sets, analogous to Shannon and Waver's symbol types: number of ways in which a medium allows information to be encoded for communication which includes physical ways such as a handshake or a gentle touch; visual ways such as raising a hand, nodding the head or closing eyes; speaking; written or digital symbols such as words, tables, images and video. Media with more natural symbol sets (physical, visual, and verbal) have a greater capability to support synchronicity as compared to media with less natural symbol sets (written or typed). Using a medium with a symbol set better suited to the content of the message will improve information transmission and information processing, and therefore will have a greater capacity to support synchronicity.

ii) Parallelism, analogous to Shannon and Waver's number of frequencies: the number of simultaneous transmissions that can effectively take place, for example if using telephone it may be very difficult to also transmit or receive another message from the same media. However, internet facilitates transmitting and receiving multiple messages at the same time. It lowers shared focus which will have a negative impact on a medium's capability to support synchronicity.

iii) Transmission velocity, analogous to Shannon and Waver's transmission capacity: the speed at which a medium can deliver a message to intended recipients. It improves shared focus which will have a positive impact on a medium's capability to support synchronicity.

Processing capabilities

iv) Rehearsability, analogous to Shannon and Waver's encoding: the extent to which the media enables the sender to rehearse or fine tune a message during encoding. It lowers shared focus, which will have a negative impact on a medium's capability to support synchronicity.

v) Reprocessability, analogous to Shannon and Waver's decoding: the extent to which the medium enables a message to be re-examined or processed again. It lowers shared focus, which will have a negative impact on a medium's capability to support synchronicity (adapted from Dennis et al. 2008)

Figure 3.2 depicts the media capabilities in the communication system as conceptualised by the Media Synchronicity Theory.

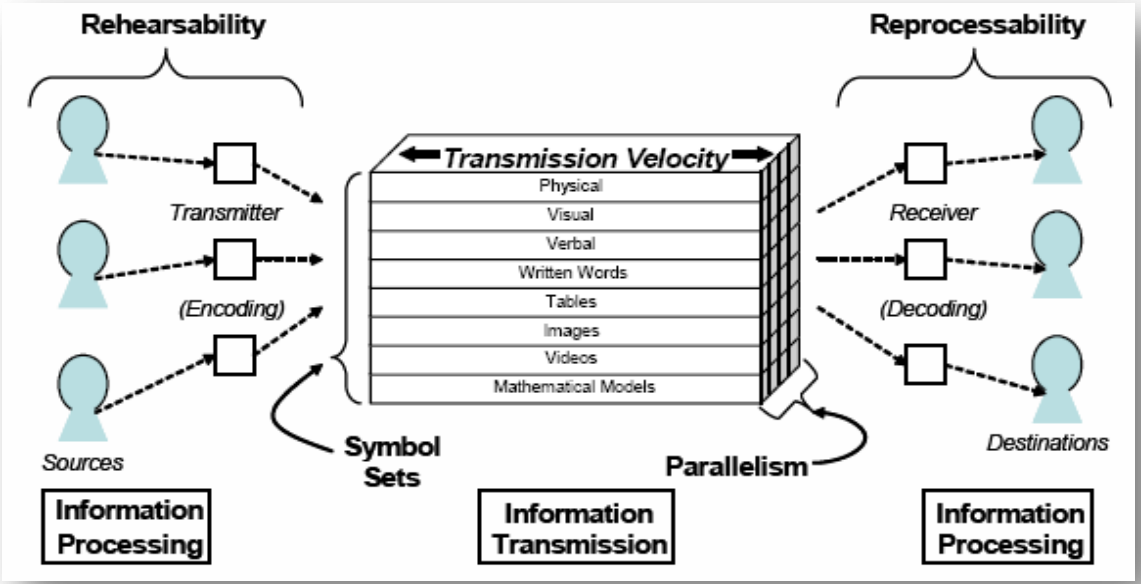

Figure 3.2 : Communication system and media capabilities (Dennis et al. 2008)

Media Synchronicity Theory argues that media that have strong capabilities to support information transmission typically lack strong capabilities to support information processing and vice versa. Going further, Dennis et al. (2008) have assessed the media capabilities of some common media and derived the synchronicity values for those media. Table 3.2 lists some of these media together with the values of the media capability and derived synchronicity. It can be noted that face-to-face and video conferencing have been assigned high synchronicity whereas asynchronous media, voice mail and documents have been assigned low synchronicity. Although not included in the Table 3.2, telephone conference and synchronous electronic communication such as instant messaging have been assigned medium synchronicity.

Table 3.2: Synchronicity of selected media based on their capabilities (Dennis et al. 2008)

Media	**Transmission velocity**	**Parallelism**	**Symbol sets**	**Rehearsability**	**Reprocessability**	**Information transmission**	**Information processing**	**Synchronicity**
Impact on synchronicity »	**+ ve**	**- ve**	**+ ve**	**- ve**	**- ve**			
Face-to –face, video conference	High	Medium	Few-many	Low	Low	Fast	Low	High
Asynchronous electronic mail / conferencing	Low-medium	High	Few-Medium	High	High	Slow	High	Low
Voice mail	Low-medium	Low	Few	Low-medium	High	Slow	Medium	Low
Documents	Low	High	Few-Medium	High	High	Slow	High	Low

Media Synchronicity Theory proposes that for conveyance processes, use of media supporting lower synchronicity should result in better communication performance

whereas for convergence processes, use of media supporting higher synchronicity should result in better communication performance. It argues that successful completion of most tasks involving more than one individual requires both conveyance and convergence processes; and thus, communication performance will be improved when individuals use a variety of media to perform a task, rather than just one media (Dennis et al. 1998; Dennis et al. 2008).

It should be pointed out at this juncture that the Media Synchronicity Theory does not explicitly specify the direction of the flow of information for the convergence task which entails development of a shared meaning to information to be a two-way communication. It appears that this is thought to be achieved through two or more instances of one-way communication as opposed to the explicit specification of such a direction of flow by Habermas's theory of Communicative Action.

3.4.3 Communication tasks for media

The purpose of this section is to identify communication tasks for media in view of the aim and objectives of the research. According to IRGC risk framework (see Figure 1.1on page 5) the instrumental objective of risk communication is to facilitate flows of information and dialogue at all stages of risk governance. At the functional objectives stage, the objectives of flood risk communication when centred on an agency as communicator and groups of the public as target audiences are stated to be: enlightenment, fulfilling people's right-to-know, attitude change, legitimation, risk reduction, behavioural change, emergency preparedness, public involvement, public participation, and fulfilment of legal duties (see section 1.3). To achieve the above objectives, media play the role of information intermediaries (or conveyers of messages, information channels or tools) to facilitate this either one-/two- way flow of information (or communication) between social actors (see section 1.7).

Further, depending on the timing of the communication in relation to a risk incident, certain communication is categorised as dissemination of information, issuance of warning or holding a dialogue / debate. Of these issuing information and warnings entail one-way flow of information as opposed to two-way flow of information during a dialogue or debate.

As elicited earlier in section 3.2.3, it has been contended that risk communication helps in eradicating knowledge insufficiencies. Providing information on hazards produces greater information seeking behaviours while longer exposure to risk information leads to stronger risk perception (Keller et al. 2006). It has also been contended that increased awareness leads to better preparedness (see section 3.2.6), increased circulation of information motivates people to participate in the risk dialogue (see section 3.2.7), and helps in building trust and the credibility of the communicator. Thus, it can be seen that apart from promoting dialogue with the public, raising awareness of flood risk and issuing flood warnings can be stated to be two major tasks for media communications, especially when the flood risk communication is between a communicator agency and general public. Thus, 'flood risk awareness' and 'flood risk warning' are the two subtasks of the overall task of 'communicating flood risk' discussed in this thesis.

Referring to the media theory selected for this research, Media Synchronicity Theory (see section 3.4.2), 'flood risk awareness' task is analogous to the development of knowledge, generating understanding and building a mental model. The task of 'flood risk warning' is analogous to transmitting short messages so that the recipients can relate this information to their knowledge or mental models and arrive at a shared meaning or make sense of the information.

These tasks also align well with both the aspects of a communication task as proposed by this theory: conveyance (transmission of new information to generate shared understanding or create a mental model for flood awareness) and convergence (transmission of short messages to generate shared meaning for flood warning). These also align well with Habermas' Theory of Communicative Action through which he calls for communication to pass the tests of 'rationality' and 'reflexivity' for the ultimate aim of the development of shared understanding between social actors.

3.5 Developing a risk communication strategy

It is well known that risk communication is a proven methodology for formulating and delivering strategies which reduce potential losses and reach communities swiftly and authoritatively (Granatt 2004) albeit with adequate scientific understanding or etic perspective and understanding of the social and cultural factors or emic perspective

(Murck et al. 1997 cited in Hansson et al. 2008). The discussion in this chapter has considered how the public's perception of flood risk is affected by various factors (see section 3.2), the various risk communication models (see section 3.3) and the theories which support selection of media for risk communication (see section 3.4). In particular, section 3.2 highlighted the relevant factors attributed to individuals (perceived susceptibility, prior exposure to hazard, prior knowledge and availability of information), to society (such as socio-demographics, sense of community, place and culture), to risk messages and finally the role of trust. The next section, section 3.3 elaborated on risk communication models and discussed the basic model of communication by Shannon and Weaver and its modified form known as Social Amplification of Risk Framework (SARF). It then highlighted the inadequacy of these models to support a mechanism of two-way communication between the communicators and the at risk communities. In this process, it identified Habermas's Theory of Communicative Action which supported such a mechanism. Section 3.4 then elaborated on media theories which may facilitate the task of identifying media for risk communication, both for transmission of information and for facilitating a dialogue. Thus, the thesis has been arguing for stakeholder engagement approach for flood risk communication through media which are suitable for carrying out such tasks.

3.5.1 Stakeholder engagement

The benefits and risks of stakeholder engagement were briefly mentioned while discussing the role of trust in section 3.2.7. On similar lines Richardson et al. (2003) argue that more effective public participation can help in building trust and understanding between the public and the professionals. It has also been contended that simply telling people that a risk decision was reached through a participatory process increases their support for the decision because it is related to people's satisfaction with the process than with the outcome of the decision (Bostrom & Löfstedt 2003). This argument is similar to the contention by Maxwell (2003) who states, by referring to risk communication research, that the public can tolerate significant hazard levels when their emotional reaction about a risk event is low, but that insignificant hazards may not be tolerated when the public perceives agencies as unresponsive or unconcerned about public health.

It has been asserted that different stakeholders have different perceptions of the goals of the participatory process, and these are closely related to their notions of success. Therefore it has been asserted that it is important to understand the complexity and importance of using multiple frameworks for evaluating participatory efforts which deserve systematic evaluations (Santos & Chess 2003). Bronn & Bronn (2003) recommend employing the stakeholder theory as they recognise it to be an important contributor in that it provides a means for identifying the relevant participants in the context of the ever-increasing influence of stakeholder groups and responsibilities of organisations in society.

It has been pointed out that policy-makers tend to agree that citizen participation is key to developing acceptable and sustainable environmental policies. Traditionally such participation is claimed, however, to suffer from claims that citizens who participate do not represent the views of the community. Another commonly heard criticism is that participating citizens do not understand enough about science or environmental risk to evaluate the policy choices or the consequences of their decisions (McComas & Scherer 1999; Green & Penning-Rowsell 2010). The discussion over whether community preferences have a legitimate role to play in priority setting has been highly polarised. Sceptics warn of the risk of establishing a 'dictatorship of the uninformed', while advocates proclaim the legitimacy of the participatory process (Wiseman et al. 2003, Green & Penning-Rowsell 2010). To develop further understanding of this issue, a study on different types of expertise, the relationship between science and society and the role of the expertise of the public and the experts or scientists has been undertaken by Collins and Evans (2002). Nevertheless, it has been claimed that the public overwhelmingly want their preferences to inform priority-setting decisions. Further, it is claimed that public preferences are particularly important in informing decisions about how to prioritise resources across broad programmes and which criteria should be used to allocate funds across different population groups. In most cases, however, studies do not advocate the use of one particular group's preferences but the preferences of a range of groups. In one study, the preferences of politicians were viewed as least important to processes of priority setting (Wiseman et al. 2003).

Going further, it has been warned that conflict resolution and risk communication programs are likely to be rejected by the general public as long as the teaching and

communicating processes are not conducted in parallel (Renn 2004). It has also been stressed that while public perception and common sense cannot replace science and policy, they can certainly provide the impetus for the decision-making process. At the same time it has been contended that if decision-makers take into account the relevant factors (see section 3.2) and public perception, then public willingness to accept rational models for decision-making is likely to increase (Renn 2004).

On stakeholder engagement as a process, it has been suggested that it requires risk managers to consider the following points:

1. Is the purpose of the solicitation of input from stakeholders clearly stated and communicated?
2. Are all the appropriate stakeholders identified and included?
3. Are information elicitation tools appropriate to the type of information requested used?
4. Are the tools rigorously applied?
5. Are the resultant data analysed using appropriate techniques?
6. Is the entire process (including its methodology) documented? (Glicken 2000)

On similar lines 'Seven Cardinal Rules of Risk Communication' have been proposed by Covello and Allen (1988) which state:

1. Accept and involve the public as a partner
2. Plan carefully and evaluate your efforts
3. Listen to the public's specific concerns
4. Be honest, frank, and open
5. Coordinate and collaborate with other credible sources
6. Meet the needs of the media
7. Speak clearly and with compassion

However, section 2.5.2 also highlighted that one-way communication also has relevance as long as such a risk communication strategy is informed by consideration of factors and issues identified by a two-way communication with the communities in the first place. It means that a one-way communication may be undertaken as long as 'the communicator' and the 'at risk communities' have reached a common understanding

and the 'at risk communities' trust 'the communicator' (see section 3.2.7). Stickler et al. (2011) reinforce this argument by stating that to plan a risk communication strategy, it is necessary to discover the status of knowledge and risk perception of the local population and understand on which values and attitudes can affect risk perception of 'the communities at risk'. Further, Höppner et al. (2010) clarify their understanding of 'risk communication' as: both a one-way transfer of hazard and risk related information and their management, and as a two-way exchange of related information, knowledge, attitudes and/or values. Thus, Höppner et al. (2010) reinforce the argument of this thesis which proposes that one-way communication still has relevance but only for transfer of information but not for exchange of information to develop knowledge. Richardson et al. (2003) highlight the role of the National Flood Forum in England which was formed after the Bewdley Residents Committee; a local group providing support for those affected by flooding approached Environment Agency, UK. It has been claimed that it helped the Environment Agency in working in partnership with the local community to identify possible causes of flooding, develop flood response plans and assess the public views on various strategic and national issues regarding flood management (Richardson et al. 2003).

Nevertheless, as Höppner et al. (2010) identify a single best practice guide to risk communication is neither appropriate nor achievable (Burton et al. 1993 cited in Höppner et al. 2010) and rather, communication has to be adapted to the characteristics of the hazard (Faulkner 2007), the expected intensity and impacts of a particular event, the context of the communities at-risk, the characteristics of the receiver, and the objectives of communication (and hence stage in the risk management cycle). With this background and to further the principal aim of this research (which is to identify gaps in flood risk perspectives between 'communicating agencies' and 'communities at risk of flooding', see section 1.9), the following section sets out to identify key factors to consider in developing a flood risk communication strategy. Obviously, the strategy should be considered for guidance and not as a prescriptive strategy for bridging the gap between 'the communicators' and 'the at risk communities'. The identified flood risk communication strategy is depicted in Figure 3.3 on page 92. The following subsection discusses its structure.

3.5.2 Flood risk communication strategy

Given the importance of 'understanding the process of risk communication' and 'the influencing barriers and factors' by 'the communicators', the flood risk communication strategy includes the understanding of the process, factors and barriers of risk communication as the first stage while setting out for communicating flood risk with the 'at risk communities'. The second stage then focuses on the community-, place- and culture-specific understanding and thus includes an assessment of current knowledge, needs and expectations of the communities at risk of flooding to align their perspective (etic) with that of communities (emic). Since both these stages are influenced by the characteristics of the 'at risk communities' and the factors defining risk perceptions, in addition to literature on flood risk communication, these should be informed by understanding gained through participatory communication with the 'at risk communities'. The third stage of establishing trust with the 'at risk communities' would then naturally follow. However, this should be assessed and additional participatory communication carried out so as to establish trust with the 'at risk communities'.

The next stage (fourth) should include internal organisational review to review the capability of 'the communicator' in terms of resources and systems for generating information which might address the communication needs and expectations of the communities at risk of flooding. Having established whether 'the communicator' might be in a position to address the communication needs and expectations of the communities at risk of flooding, the next stage (fifth) should identify topics and media for flood risk communication. Giannini & Giupponi (2011) suggest a Knowledge Integration Table (KIT) for integrating of scientific and local knowledge. They contend that it lays the foundation for the identification of the gaps. Although in their case it was proposed for identification of gaps between the existing legal framework and real life needs, it can be used for flood risk communication to build knowledge and understanding on various issues.

Some of the communication identified through all the previous stages may call for more participatory communication with the communities at risk of flooding or as suggested by Löfstedt (2005), the needs of communication or the governing conditions or requirements of communication may be suitable for carrying out a top-down

communication. As such the sixth stage shall entail carrying out 'flood risk communication' in 'real sense'.

Whether a communication exercise has served its purpose or not shall be the subject of next stage (seventh) at which the risk communication efforts shall be evaluated. Evaluation relates to performance measurement and it has an internal and an external function. The internal function relates the managerial aspects whereas the external function relates to the democratic aspect of performance information (Pollitt, 2006 cited in Nõmm & Randma-Liiv, 2012). Nõmm & Randma-Liiv (2012) contend with reference to Talbot (2007) and Pollitt and Bouckaert (2004) that internally evaluation helps in informing specific decisions, creating benchmarks, determining budget allocations and justifying management decisions whereas externally it helps in demonstrating accountability, control, democratic legitimacy and transparency to the public, legislature and politicians in addition to helping in improving public relations. Therefore it can be contended that evaluation of communication efforts not only ensures that those would be more effective but it may also help in building up of trust.

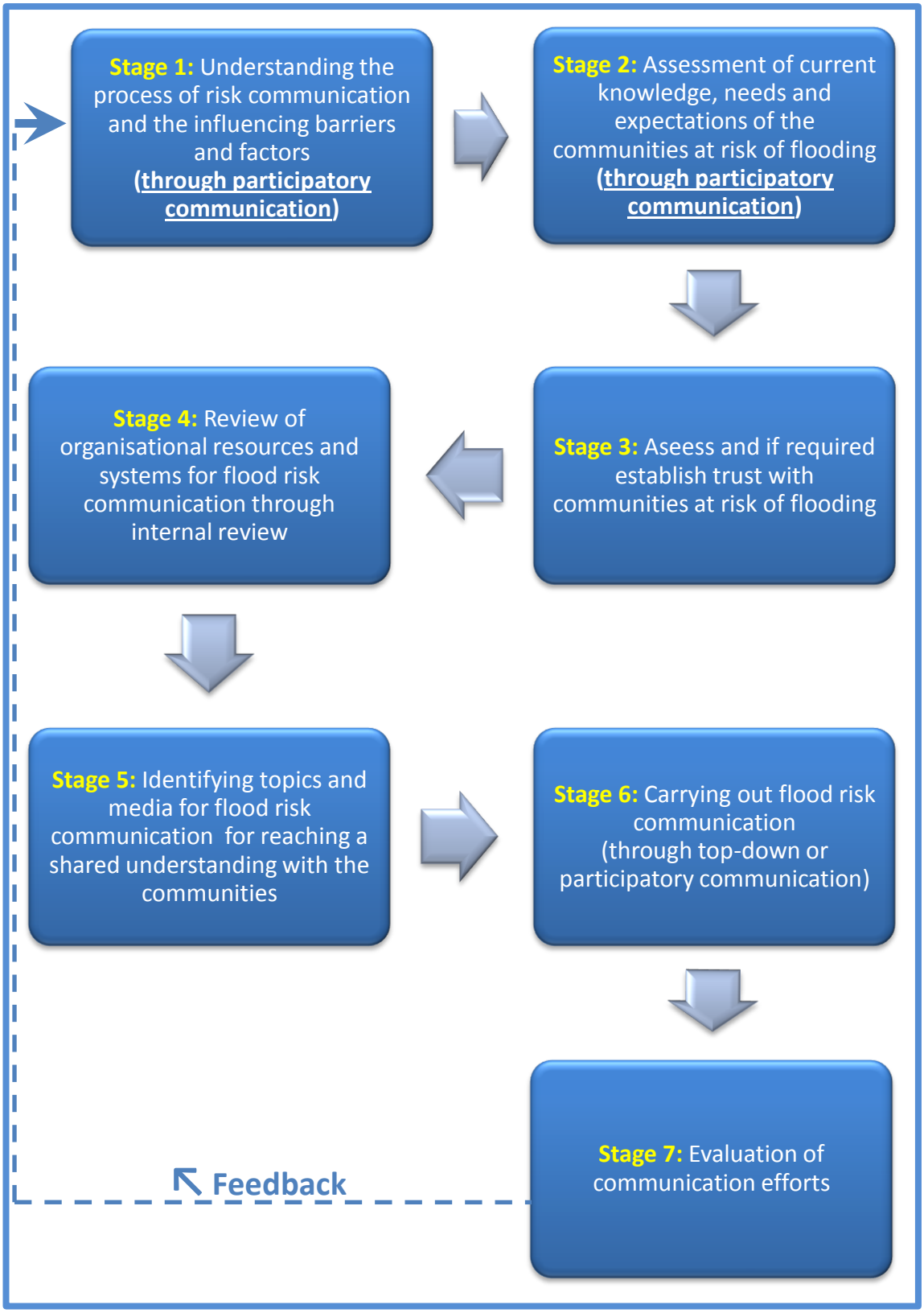

Figure 3.3: Flood risk communication strategy

Stickler et al. (2011) recommend use of a self-assessment tool which makes use of predefined 'key performance indicators (KPIs)' and their main attributes to facilitate

evaluation of communication efforts. Alternatively indirect means of evaluation, such as using 'increased uptake of flood insurance' as an indicator of behaviour change, may be developed.

The outcomes of the evaluation exercise may then be incorporated into organisational learning process to modify the process of risk communication in order to ensure that it performs better against these KPIs. This 'Feedback' mechanism is depicted as a dotted line in Figure 3.3.

Lastly, as it is known that the availability of knowledge of people decreases over time (Schütz & Wiedemann 2000) and that continuous and longer exposure is known to lead to stronger risk perception (Keller et al. 2006), risk communication needs to be a continuous process and should not stop at the seventh stage but should resume with the first stage.

3.6 Summary

This chapter elaborated on factors which are known to affect how emic perspectives of flood risk are formed. It then discussed communication models such as Shannon and Weaver's basic communication model, Social Amplification of Risk Framework (SARF) and identified how these communication models lacked the capacity to support stakeholder engagement – which the Habermas's Theory of Communicative Action supports. This chapter also discussed the theories which may support media selection for risk communication, particularly Media Richness Theory and Media Synchronicity Theory.

The chapter concluded by presenting a risk communication framework which is based on the discussions presented in the thesis so far. This chapter, together with the previous chapters forms the theoretical background for the research and research methodology. The research methodology adopted for this research was designed with due consideration to the various issues linked to flood risk communication, most significantly engagement with the stakeholders and following the specifications of Habermas's Theory of Communicative Action. The research methodology is presented in the next chapter.

Chapter 4
Research Methodology

4.1 Introduction

Chapter 1 discussed the research question, aim and objectives of the research whereas Chapter 2 and Chapter 3 presented relevant theories and literature related to flood risk communication. This chapter presents a detailed account of the methodology adopted for this research, including the reasons behind the choice of methodology and how the chosen research methodology addresses the research aim and objectives. It includes an identification of the research strategy in view of the epistemological and ontological orientation of the research, data collection methods and the tools and techniques for analysing the collected data as well as the selection of study sites and the identification of relevant agencies for the research.

Before discussing the research methodology in detail, it will be useful to revisit the rationale and aim of the research which is presented in section 1.9. It is based on the discussions presented in Chapter 1 and it proposes three areas of enquiry worth researching in the context of flood risk communication: i) identifying gaps between etic and emic perspectives, ii) identifying processes for bridging those gaps and, iii) appraising media selection for communication. Accordingly the aim of the research was defined as: to identify gaps in flood risk perspectives between 'communicating agencies' and 'communities at risk of flooding', and to evaluate suitability of various media types for flood risk communication. The research also aims to provide a framework based on Habermas's Theory of Communicative Action to facilitate bridging of any gaps between the etic and emic perspectives and to generate useful information to facilitate selection of media that are most suitable for communication on flood risk by reviewing applicability of Media Synchronicity Theory. Accordingly, the research objectives have been then set as:

1. To understand community knowledge, expectations, and media usage and preferences related to flood risk communication
2. To review communication objectives and efforts of the responsible agencies

3. To identify differences between community knowledge, expectations, media usage and preferences, and the communication efforts of the responsible agencies
4. To appraise the role of Habermas's Theory of Communicative Action and Media Synchronicity Theory in supporting the development of flood risk communication strategies
5. To consider the implications for developing effective flood risk communication strategies by the relevant agencies and make appropriate recommendations

A conceptual representation of the research aim and objectives is shown in Figure 4.1.

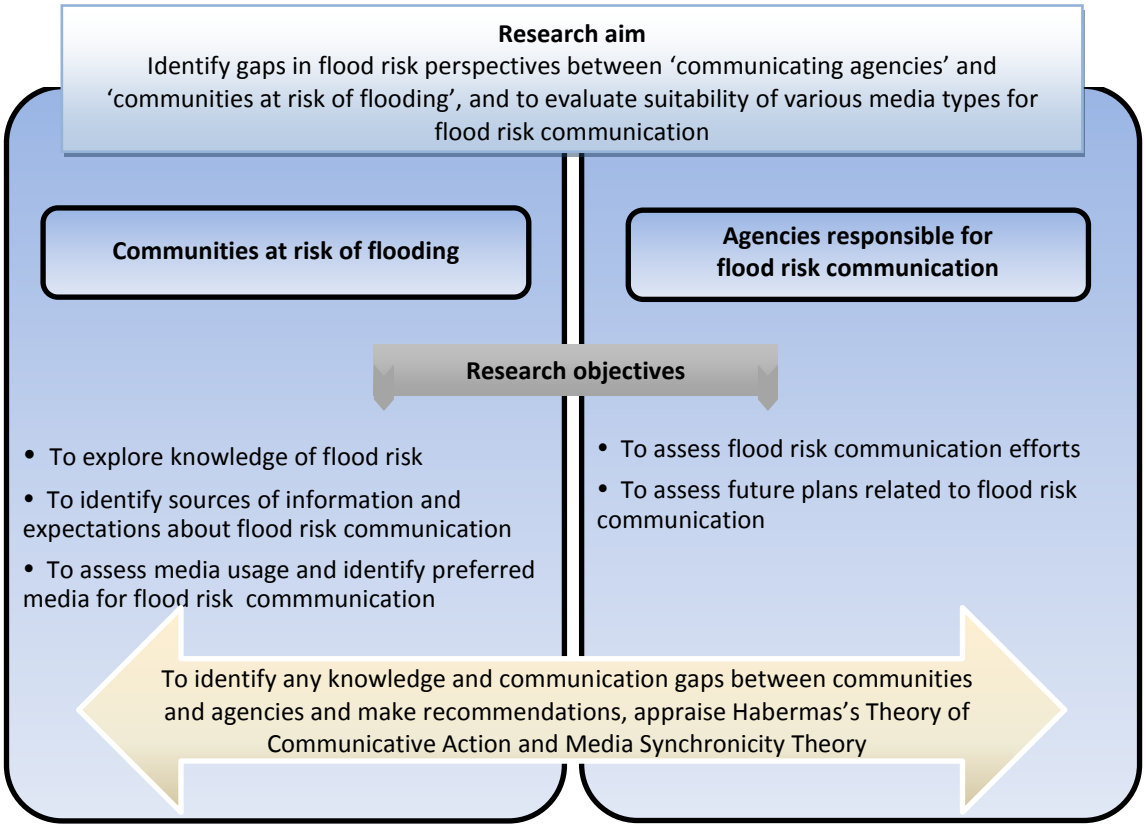

Figure 4.1: Conceptual representation of research aim and objectives

This research used cross-sectional research design which involved collection of data from individuals, groups and agencies during a certain time period. The research is carried out with an inductive stance and within the interpretivist / constructionist paradigmatic positions based on epistemological / ontological considerations respectively. The choice and implications of the research stance and the paradigmatic

positions are explained in detail in the next section. The research used both quantitative and qualitative research strategies by employing postal survey, one-to-one interviews and focus group discussion research methods. Postal surveys were employed for the quantitative research whereas one-to-one interviews and focus groups were employed for the qualitative research. However, the quantitative data and analysis was used for investigating some aspects of the research where it supported the qualitative data collection and outcomes. Thus, the research is essentially a qualitative study but supported with quantitative research strategy wherever possible.

The research gathered information from individuals and groups at flood risk in three study sites, Edinburgh, Stirling and Callander in Scotland and in addition, collected data from six agencies related to flood risk communication which included SEPA, local councils, police as well as fire & rescue services. The various elements of the research methodology are depicted in Figure 4.2.

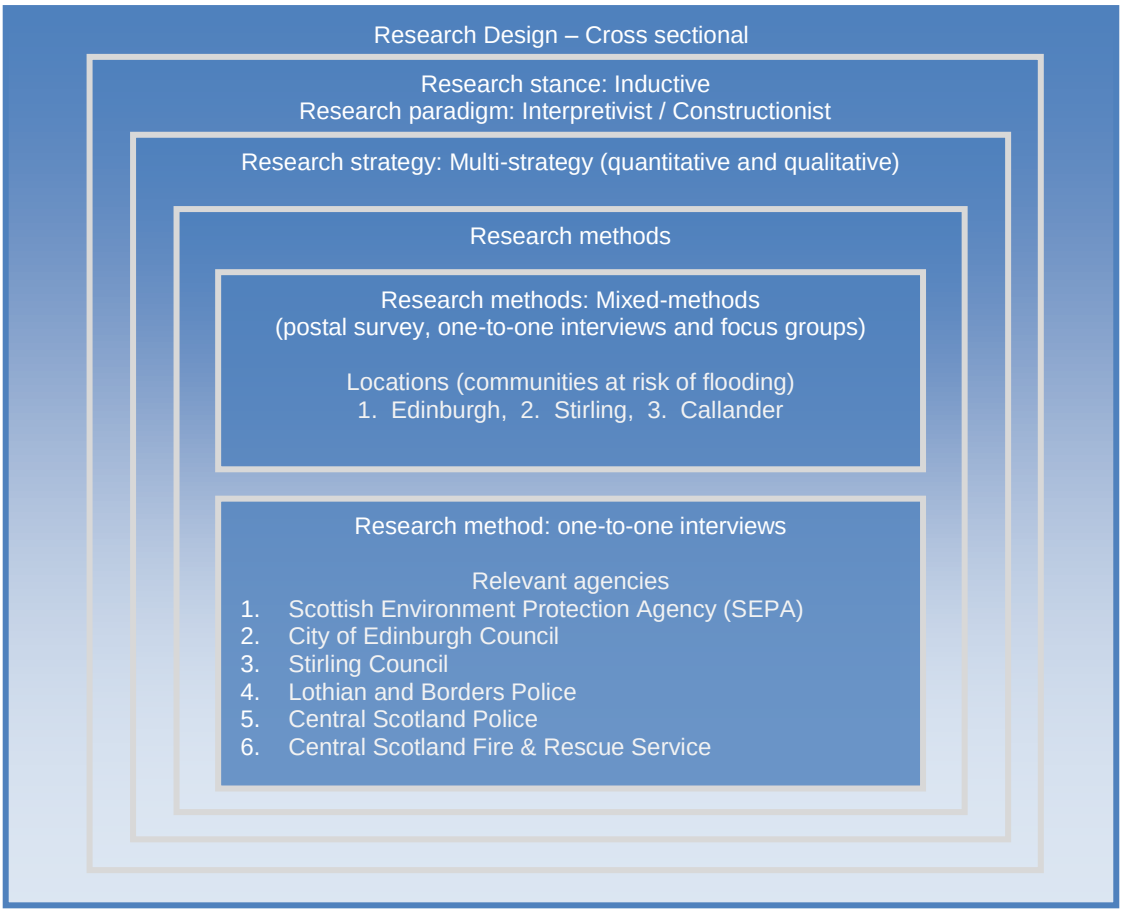

Figure 4.2: Overview of research methodology

The selection of research strategy and research methods (data collection tools and techniques) for collecting relevant data is explained below in section 4.2 whereas how the study sites were selected is explained in section 4.3. Section 4.4 explains the criteria employed while selecting the agencies for the research. The details of the postal survey, one-to-one interviews and focus group discussions involving the members of the communities are presented in sections 4.5, 4.6 and 4.7 respectively whereas the details of the interviews of the representatives of the agencies selected for this research are presented in section 4.8. Section 4.5.5 presents how the quantitative data acquired through the survey will be analysed. Similarly section 4.8.3 presents how the qualitative data acquired through the interviews and focus group discussions will be analysed. Section 4.8.4 provides details of further analysis using both the quantitative as well as the qualitative data. Finally, section 4.9 provides a summary of the chapter.

4.2 Research framework and research design

The research aim and objectives were systematically fulfilled by formulating a research design, to investigate flood risk related knowledge and communication gaps between the communities at risk of flooding and the agencies responsible for flood risk communication. The research design included identification of appropriate research strategy, research methods, the target population and agencies for investigation. This section establishes congruency between the research objectives and the adopted research design.

4.2.1 Research stance

As observed in previous chapters, most of the literature related to flood risk communication refers to policies and requirements of various laws. These neither adequately address the issues related to flood risk communication from the perspectives of the communities nor does it adequately identify their preferred media. Further, the literature does not address how the flood risk communication efforts by the relevant agencies fulfil the objectives of flood risk communication and the needs of the communities at risk of flooding. A review of the objectives of the research (see section 1.9) would also emphasise that the nature of the research needs to be exploratory. An exploratory research requires taking an inductive stance. By employing an inductive stance, theory can be generated based on analysis of data collected for a project (Bryman 2004). In this research, it was anticipated that collection and analysis of data

would lead to identification of flood risk related knowledge gaps between the communities and the agencies responsible for flood risk communication as well the media preferred by the communities for flood risk communication. As explained below, the research is carried out with the interpretivist / constructionist paradigmatic positions of epistemological / ontological considerations respectively. This fits well with the essentially qualitative nature of the study.

4.2.2 Epistemological paradigmatic position

According to Kuhn (1970 cited in Bryman 2004), a paradigm is 'a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done and how results should be interpreted'. In the field of social sciences, Positivism and Interpretivism are the paradigmatic positions based on epistemological – what is (or should be) regarded as acceptable knowledge in a discipline – considerations and Objectivism and Constructionism are the paradigmatic positions based on ontological – whether social entities can and should be considered objective entities – considerations (Bryman 2004).

Interpretivism is the epistemological position which shares a view that the subject matter of the social sciences – people and their institutions – is fundamentally different from that of the natural sciences and therefore requires the researcher to grasp the subjective meaning of social action. It asserts that there is a fundamental difference between the subject matter of the natural sciences and the social sciences and that an epistemology is required that will reflect and capitalise upon that difference. It believes that social reality has a meaning for human beings and that it is the job of the social scientists to gain access to people's 'common-sense thinking' and hence to interpret their actions and their social world from their point of view (Bryman 2004). The focus of this research, flood risk, is a subjective concept as the various aspects related to it, for example relevant knowledge and sources of information, can vary from person-to-person in line with the emic perspective and pertaining to the role of rationality and reflexivity in social domains which has been extensively discussed in the previous chapters in light of three social theories: Giddens's theory of reflexive modernity, Beck's theory of reflexive modernity and Habermas's Theory of Communicative Action. The same can also be said about the media one may prefer for flood risk communication. In addition, there could be variation depending on where one lives and

the range of associated social contexts. These and other factors which justify this argument have been presented in detail in Chapter 3. As such, to gather relevant research data or information to fulfil the objectives of the research, it was essential to gain an insight into peoples' minds. As explained earlier, interpretivism is the epistemological position which facilitates this particular requirement and as such is adopted for this research.

4.2.3 Ontological paradigmatic position

Constructionism is an ontological position which asserts that social phenomena and their meanings are continually being accomplished by social actors. This, thus, challenges the suggestion that categories such as organisation and culture are pre-given and therefore confront social actors as external realities that they have no role in fashioning. The social actors in the context of this research are the members of the communities living in areas identified to be at risk of flooding whereas organisation and culture refer to agencies responsible for communicating flood risk to them and the domain of flood risk communication itself respectively. From this and as stated in the earlier paragraph, due to individual circumstances and preferences, the members of the communities at flood risk may have different levels of flood risk knowledge, various sources of flood risk information and varied expectations related to flood risk communication. Influence of these and other factors, which confirm the reflexive nature of flood risk perception, have been highlighted in the previous chapters, most notably in light of three social theories: Giddens's Theory of Reflexive Modernity, Beck's Theory of Reflexive Modernity and Habermas's Theory of Communicative Action. The effectiveness of flood risk communication with them, therefore, would be dependent on how they construct flood risk and view their role and responsibilities in relation to those of others including local authorities and other agencies, and the communication efforts of the agencies and the media employed for communicating flood risk to them. This, thus, justifies constructivist approach as the adopted ontological position for this research. As mentioned at the outset, this position asserts that social phenomena and their meanings are continually being accomplished by social actors.

4.2.4 Research strategies and research methods

A research paradigm is characterised by a research stance (deductive / inductive), a research strategy and is associated with particular methods of data collection and data analysis. There are two basic research strategies in the field of social science: quantitative and qualitative. Apart from the fact that quantitative strategy involves collection and analysis of numerical data which a qualitative strategy does not, there are other important differences which can have substantial implications when a particular strategy is chosen over another (Bryman 2004; Bryman 1988). Further, it has been argued that an important feature of paradigms (quantitative and qualitative research strategies are often considered as paradigms (Bryman 2004, Fielding and Fielding 2008)) is that they are incommensurable – that is, they are inconsistent with each other because of their divergent assumptions and methods. However, Bryman (2004) warns against hammering a wedge between them too deeply. This is because in practice, he states, there are examples of studies in which qualitative research has been employed to test rather than generate theories and vice versa. He further states that many authors recommend combining the two research strategies (multi-strategy research) as, it is thought that combining the two research strategies may allow them to capitalise on the strengths and offset the weaknesses of both strategies. Further, multi-strategy research facilitates 'triangulation' which entails the use of quantitative research to corroborate qualitative research findings or vice versa. In this study, quantitative data is used to inform the qualitative study and to support its findings, where possible.

The idea behind triangulation is that data produced through applying different methods can be compared in order to confirm or disconfirm each other's results (Barbour 2008). In addition to corroborating the findings, triangulation also enhances the validity of the findings where each method is associated with compatible ontological and epistemological perspectives (Blaikie 1991 cited in Fielding and Fielding 2008) and scope and depth of understanding (Fielding and Fielding 1986, Denzin and Lincoln 2000, and Fielding and Schreier 2001 cited in Fielding and Fielding 2008), and hence the rigour of the research (Fielding and Fielding 2008). Further, according to Hammersely (1996 cited in Bryman 2004) it can also be employed in a 'complementary' order so that different aspects of an investigation can be dovetailed.

Fielding and Fielding (2008) further describe that triangulation can use multiple methods, data sources, investigators, and methodological and theoretical frameworks; and that methodological triangulation has two variants: 'within-method' where the same method is used on different occasions and 'between-method' where different methods are applied to the same subject. This research belongs to the 'between-method' variant. They further argue that triangulation prompts in researchers a more critical stance towards their data and that it enables qualitative researchers to adopt the stance often characteristic of the quantitative researcher, for whom conclusions are always 'on test' and whose relationships to the data is not uncritical 'immersion' but measured detachment. They argue that the value of triangulation lies more in 'quality control' than any guarantee of validity and that triangulation promotes more complex research designs that oblige researchers to be more clear about what relationships they seek to study, what they will take as indicators of these relationships and so on. Finally, they argue that our knowledge about the objective truth is always partial and incomplete and a fuller understanding is gained - although not necessarily more objective or more valid than when gained using only one research method - by tackling the research question in several ways; and that expanding the sources of knowledge on which we can draw by using different methods and approaches we can make it less partial and incomplete.

From the above, it was realised that a multi-strategy or multi-method research would be useful in more than one way. Of particular importance were the strong points of the individual research strategies. A quantitative research strategy is associated with 'hard' and 'reliable' data which can be subjected to the criteria in social research – reliability, replication, validity and trustworthiness (Bryman 2004). Further, as there is virtually no contact of the researcher with the subjects, the findings have virtually no influence of the researcher. On the other hand, a qualitative research strategy is associated with 'rich' and 'deep' data and there is considerable contact of the researcher with the subjects. This research strategy, thus, facilitates exploring various aspects of a research question by looking at the research question from the 'eyes of the subject' and is particularly associated with generating a theory and as such with the inductive stance which this research has adopted.

Given the inductive stance of the research and the interpretivist / constructionist paradigmatic positions based on epistemological / ontological considerations which are

normally associated with a qualitative research strategy, the choice of the qualitative research strategy was obvious and it was expected that it would yield 'rich' and 'deep' data. The research used one-to-one interviews and focus group discussions for supporting the qualitative research strategy. While one-to-one interviews are generally known to be better suited to eliciting detailed contextualised histories, focus groups are known to be useful when it comes to investigating why participants think as they do. Thus, focus groups are known to have the capacity to reflect issues and concerns salient to participants rather than closely following the researcher's agenda. This means that the resulting data can yield surprises (Barbour 2008).

Furthermore, as with the quantitative / qualitative research strategies, despite generally being positioned on opposite sides of the positivist-interpretivist / constructionist divide, several researchers have argued that focus groups and surveys are useful complementary methods and should not be seen as mutually exclusive approaches (Barbour 2008). Barbour (2008) also states that there are examples of mixed methods approaches that used focus groups following the quantitative phase of research to illuminate results, that is, to transform these into 'findings' by furnishing explanations, particularly with regard to surprising or anomalous associations identified in the first part (quantitative) of the study. This was certainly the case in this research, as will be explained in Chapter 8.

However, initial attempts to gather qualitative data by conducting focus group discussions, as detailed in section 4.7.2 were not satisfactorily successful. While these data gathering efforts were ongoing, during a meeting with the Stirling Council in relation to this research a possibility of collecting data with their help was discussed. Stirling Council suggested a postal survey in addition to focus group discussions. Therefore, a questionnaire was designed for collecting data using the postal survey method. There are several benefits of using this method as Bryman (2004) argues: postal questionnaires are cheaper and quicker to administer, they eliminate the effect of the researcher on the researched people or subjects, are convenient for both the researcher and the subjects, the questions are presented to the subjects in a consistent manner and most importantly they generate large volumes of hard and reliable data. Section 4.5 provides further details on how the postal questionnaire was designed and how data were collected using this method. A quantitative research strategy, which is

normally associated with testing of theories rather than generating theories, thus, was used in this research to facilitate an inductive stance.

Thus, in addition to the benefits to the research pertaining to the strengths of the individual research strategies and the associated research methods, combining these for this research was expected to facilitate corroboration of the findings ('triangulation'). It was also anticipated that the research methods could have specific findings associated with them individually and that these findings could complement each other.

As listed in section 4.4, six agencies were chosen for investigation and to elicit etic perspective in relation to the various aspects of communicating flood risk to the communities living in areas identified by them and the media they used for such communication. The aspects under investigation included their current and future efforts and their understanding of flood risk communication – their professional mindset as an agency responsible for *effective* flood risk communication to the communities living in areas identified to be at risk of flooding as identified by them. Although it was possible to send out a questionnaire by email or by post, it was thought useful to interview the officers of the agencies. The main reason behind this thinking was to carry out the investigation with due understanding of the perspectives of the agencies – details of which were not available in the literature review. Further, conducting an interview with one officer from each of the identified agencies was thought to be manageable during the research due to their small number. Therefore, interviews were conducted to collect data from the identified agencies. Accordingly, tailored interview guides were prepared for interviewing the agencies and are detailed further in section 4.8. The findings from the interviews were intended to compare and contrast with those derived from the data collected through postal surveys, interviews and focus group discussions which constitute the emic perspective of the communities living in flood risk areas as identified by these agencies.

The details of the data collection exercise are presented below in sections 4.5 to 4.8. In particular section 4.5 details the postal survey exercise including design of a preliminary postal questionnaire, conducting pilot survey and finalising the questionnaire in view of the suggestions and comments received, posting the questionnaire and recording the responses when received.

Sections 4.6 and 4.7 present details of the one-to-one interviews and focus group discussions of the communities identified by the agencies to be living in areas at risk of flooding. These sections also present the design of the interview and focus group discussion guides which were formulated to elicit emic perspective of flood risk; utilised later for comparing and contrasting with the etic perspective to generate findings and draw conclusions in order to fulfil the aim of the research which envisages bridging any gaps in these perspectives.

4.3 Selection of study sites

This research has been carried out while being enrolled as a full-time on campus student at Heriot-Watt University in Edinburgh, Scotland, UK. Edinburgh had suffered from floods in the recent past, the most significant being the floods in the year 2000. As a result of the floods of year 2000, hundreds of people including people from homes for the elderly were evacuated, several houses and cars were damaged and road networks disrupted (BBC News 2000). In addition, floods were reported to be occurring every year till the time of commencement of this research, although not on the same scale as the year 2000 floods (City of Edinburgh Council 2005; City of Edinburgh Council 2007)

A nearby city, Stirling also had history of flooding in the recent past and it was reported that flooding is a recurring problem that affects many communities in the Stirling Council area. Further, Stirling Council had dealt with major incidents of flooding in every year from 2004 to 2006 during which significant inundation of dwellings and business premises together with disruption to the road networks was reported (The Scottish Parliament 2007).

On the upstream of the Stirling city is a small town, Callander, which also had faced flooding in the recent past. Callander falls within the administrative boundary of Stirling Council.

According to the General Register Office for Scotland, the mid-2008 population estimates for City of Edinburgh, Stirling and Callander were 463,564, 45,750 and 3,100 respectively. Therefore, these three study sites – Edinburgh, Stirling and Callander – represent comparatively large to small communities pertaining to their populations.

Since all three sites are in Scotland they are subject to flood risk communication efforts by agencies which are required to follow the same legislation and policies. The selection of the areas close to the University also meant that frequent visits to the study areas could be carried out with relative ease and convenience.

Further, according to Louis (1982 cited in Bryman 1988), a 'multisite / multimethod' research, which entails investigation of a number of sites by employing both the quantitative and qualitative research strategies, had gained support as a strategy for examining policy innovations implemented through designing and practicing strategies that are deemed suitable for such a task. This research, too, used a similar research design and is also related to policy on flood risk communication. As such, the research findings are expected to provide a small window onto the public-policy landscape to facilitate improved flood risk communication, the aim of this research.

4.4 Selection of agencies

The selection of the agencies for investigation on flood risk communication was primarily guided by the agencies specified in the Civil Contingencies Act. As already stated in section 1.2, in Scotland the agencies responsible for warning and informing the public in relation to flooding are the local authorities, police, fire service, ambulance service, health services and Scottish Environment Protection Agency (SEPA).

Therefore, it was decided that Scottish Environment Protection Agency (SEPA) as the national level agency; The City of Edinburgh Council (CEC) and Stirling Council (SC) as the local authorities; and Central Scotland Police (CSP), Lothian and Borders Police (LBP) as well as Central Scotland Fire & Rescue Services (CSF&RS) as the police and fire services under whose jurisdiction the above selected study sites fall would be contacted for the study. A meeting was arranged with SEPA to explain the research and also to gain support for the research, in terms of identifying potential localities for research and contact details of the agencies. Only the general direction of the research was discussed and no data was elicited or collected. As a result of the meeting and after initial contact, officers of these agencies were interviewed.

4.5 Details of postal survey research

As stated above in section 4.2, postal survey was carried out for this research. The following sections detail the activities carried out for the postal survey.

4.5.1 Design of questionnaire

This thesis is centred around differences between etic and emic perspectives, approaches of communicating flood risk and the media for risk communication. Therefore, in relation to the public or the 'communities at risk of flooding', the relevant factors include socio-demographics of the public, risk perception of the public, prior exposure to flooding experience, prior knowledge and availability of information, sense of community, place and culture, characteristics of communication message, trust in communicators and media for communication. The postal questionnaire was designed in such a manner as to provide useful data in a format which can be analysed systematically to answer the research questions. The design of the postal questionnaire is discussed below in detail. A copy of the questionnaire is provided in Appendix A.

The postal questionnaire was designed to gather data through 12 questions and a sheet which was aimed at collecting socio-demographic data. These questions were grouped under four sections. The first section, section A titled "What do you know about flooding?' was aimed at understanding the perceptions of people about flood risk and the likely effects of floods on their lives and properties. This section further explored their knowledge about preventive measures to reduce the impact of flooding on their lives and properties and enquired whether they had a plan for action in an event of flooding.

The second section, section B titled 'Information about flooding' was aimed at gathering information about the people's current sources of flood risk information, their level of satisfaction about the format and availability of the flood risk information they had received through those sources and what further information they wished to receive to raise their awareness about flooding.

Section C titled 'Media usage / choice of media' was aimed at collecting data which would support identification of patterns of media usage. The questions were related to media issues like availability, cost, intrusion into privacy and technical or personal

difficulty, particularly in relation to flood risk communication purposes. The most common and likely media which could be used for flood risk communication were grouped into three groups: print media, new media or electronic media and face-to-face meetings. These were further sub-grouped into addressed and unaddressed media and arranged as a 'media matrix' as shown in Table 4.1.

Table 4.1: Media matrix

	Unaddressed	**Addressed**
Print media	**A)** newspaper, **B)** brochures, **C)** booklets, **D)** leaflets/pamphlets	**E)** letters **F)** brochures, **G)** booklets, **H)** leaflets/pamphlets
New media/ Electronic media	**I)** television news and programs **J)** television-teletext **K)** radio **L)** internet **M)** public announcement system/ loudspeaker	**N)** e-mail **O)** landline phone voice call **P)** cell phone text message **Q)** cell phone voice call
Face-to-face	**R)** exhibitions & seminars	**S)** visit to your property

Section D titled 'Media preferences' was aimed at identifying the pattern of specific media preferred for flood risk awareness and warning and included two questions eliciting information on their three most preferred media in order of preference.

For most of the questions the respondents were required to just tick mark the given options except for a few questions where they were asked to write their responses in brief, for example A, B, C, etc. The questionnaire was designed in such a way as to make it easy to record the responses in tabular form for subsequent analysis.

4.5.2 Pilot survey

Before posting the questionnaire which was designed as described in the above section, a pilot survey was carried out at Heriot-Watt University using an early version of the questionnaire. Nine PhD students and research staff were asked to fill up the questionnaire after asking them to assume that they were living in areas identified to be at risk of flooding. Although the overall feedback about the questionnaire was positive,

suggestions were made about the number of media listed and the number of questions asked. These suggestions were taken into account in reviewing and finalising the questionnaire, the final format of which was as described in the previous section.

4.5.3 Posting and collecting responses

The research was concerned only with the population which was identified as being at risk of flooding and therefore, contact was made with the Stirling and City of Edinburgh Councils to identify properties at flood risk. With the help of Stirling Council and the City of Edinburgh Council, a total of 700 postal questionnaires were sent to properties at flood risk in Stirling Council administered area, including Callander in April 2008 and a further 2,000 postal questionnaires were sent to properties at flood risk in the City of Edinburgh Council administered area in June 2009. All the properties identified to be at risk of flooding to which postal questionnaires could be sent were included in the survey. The gap of about a year in carrying out the postal survey in the two areas at different times was due to maternity leave.

The questionnaires were accompanied by a cover letter explaining the research in brief. A copy of the cover letter is provided in Appendix A. Further, pre-paid envelopes with printed return address were provided to facilitate systematic collection of responses.

4.5.4 Recording of data

As and when received, the responses from each of the questionnaires were manually recorded in a tabular form using MS Excel® software. Out of the 2700 postal questionnaires posted, 563 responses were received. Thus, the response rate for the postal survey was 20.9%; just over a fifth of the total households. Since the questionnaire were posted to all the properties in the areas identified to be at risk of flooding, this response rate also represents the views of the percentage of the total households in the selected flood risk areas included in the research.

4.5.5 Analysis of quantitative data

After survey response data was entered in MS-Excel® software in tabular form, appropriate variable names were defined and data assigned to these variables. The survey data was then imported into a more advanced and industry standard statistical analysis software, SPSS® (PASW Statistics 18). Although MS Excel® is suitable for

performing simple statistical operations; SPSS® was identified as being more useful for carrying out complex analysis.

The data was then analysed applying univariate, bivariate and multivariate data analysis techniques. During univariate analysis, no relationships among variables are configured or explored and variables are analysed on their own by considering one variable or response to a question at a time, for example an analysis of responses to variable 'gender'. On the other hand during bivariate analysis, simultaneous analysis of two variables is undertaken to see how one variable is related to another variable, for example an analysis to assess how responses to variable 'prior flood experience' are related to responses to variable 'have a plan for action'. Multivariate analysis involves analysing three or more variables simultaneously, for example an analysis to investigate whether 'perceived risk level' had influenced decisions on 'actions taken to limit impact on family' and whether it prompted the respondents to 'have a plan for action'.

The analysis exercise also involved creation of new compound variables such as 'age group' from the base variables and further analysis. Finally, MS-Excel® software was used to create graphs from the analysed data. As mentioned in sections 4.1 and 4.2, in this study the quantitative data is used to inform the qualitative study and to support its findings, where possible. Therefore, the quantitative analysis is essentially an exploratory one. The quantitative data analysis of postal survey data is presented in detail in Chapter 5.

4.6 Details of one-to-one interviews of the public

One-to-one interviews were carried out to gather data for qualitative analysis. The following sections detail the methodology adopted for carrying out the one-to-one interview exercise.

4.6.1 Design of interview guide

The design of the interview guide was largely based on the topics and relevant questions in the postal survey questionnaire. However, prompts were included after each of the questions. These were used if the participant did not understand a question or found it difficult to answer. A copy of the interview guide is provided in Appendix B. To

ensure that the interviews were completed in about an hour, a specific amount of time was allocated to each section.

4.6.2 Recruiting participants

Heriot-Watt University's News and Events online newsletter was used to invite participants living in areas identified to be at risk of flooding for an interview. The article provided a list of areas identified to be at risk of flooding in Stirling and Edinburgh which accorded to the etic perspective of areas at risk of flooding. Seven students responded to the invitation. One-to-one contact was established with these respondents so that the interviews could be carried out at a convenient time.

4.6.3 Conducting the interviews

A room was booked in the school building (School of the Built Environment, Heriot-Watt University) for the duration of the interview for all the interviews. Before the interview, each interviewee was briefed on the emergency evacuation route from the building in case a fire alarm went off; and the following:

1. Purpose of the research;
2. Sponsorship for the research;
3. Why and how the participants were selected;
4. Voice recording and confidentiality declaration;
5. Persons who may have access to the information;
6. How the input would be used;
7. That results would be published in a summary form and no individuals would be identified; and
8. When and where the output of the study would be available.

All the participants of the one-to-one interviews were university students who were living in areas identified to be at risk of flooding. The interviews were digitally recorded for later transcription. Further, participants were requested to fill up sheets containing questions related to demographic data as in the case of the postal survey.

Section 4.8.3 provides further details about the tools and techniques used for analysis of data collected during the interviews whereas Chapter 6 presents the data analysis in detail.

4.7 Details of focus group discussions

As mentioned earlier in section 4.6.2, the participants of the one-to-one interview exercise were university students. To broaden the population base for the research enquiry in terms of numbers and to obtain a more diverse sample, further focus group discussions were carried out in Edinburgh, Stirling and Callander.

4.7.1 Design of focus group discussion guide

The design of focus group discussion guide was the same as the guide used for the interview exercise detailed in section 4.6.1 above.

4.7.2 Recruiting participants

As mentioned earlier in section 4.5, a total of 2,000 survey questionnaires were posted to properties in Edinburgh and 700 survey questionnaires were posted to properties in Stirling and Callander. Accordingly, to be roughly proportionate, it was decided to hold at least one focus group discussion each in Callander and Stirling and a further two to three focus group discussions in Edinburgh.

As mentioned in section 2.5.1, in October 2006, Scottish Environment Protection Agency (SEPA) had published The Indicative River & Coastal Flood Map (Scotland). It shows areas of Scotland which are potentially at risk of flooding from either rivers or the sea (or both) which are at risk of 0.5% (1:200 year) or greater annual probability of flooding. A visual inspection of these maps guided the selection of areas for carrying out focus group discussions. It is worth mentioning that these were the same areas in which postal surveys were carried out and from which participants were interviewed using the one-to-one interview method. These are also the areas, which according to the etic perspective, are at risk of flooding.

To start with, letters were sent out to the relevant community councils in Edinburgh and Stirling. Although some community councils showed interest in supporting the research, due to the lengthy timelines involved between getting approval from the community council members and actual arrangement of the focus group event, it was decided to proceed independently with advertising and arranging the focus group events.

Accordingly, the first focus group was planned for the last week of November 2007 in Currie. A watercourse, Water of Leith runs along the outskirts of three villages Balerno, Currie and Juniper Green which are also part of the City of Edinburgh. Currie Kirk in Currie was arranged as the venue for the focus group. Leaflets were hand dropped to 20 identified properties in Currie and Juniper Green three to four days before the event.

The event received poor response with only one person attending the group discussion. As only one person was involved, the focus group essentially turned out to be a one-to-one interview. Therefore, the proceedings of this focus group event are analysed as part of the one-to-one interview data.

An analysis of the reasons for the low participation rate revealed the following:

1. Too short notice was given to the people to plan and attend the event
2. Due to the festival season, people were not willing to attend such events
3. The event was held on Thursday, which some people use for weekly shopping
4. Most of the properties to which leaflets were distributed appeared to have high walls which appeared to protect them against flooding from the river and the people residing in those properties might have thought that the discussion was irrelevant to them

With the above realisation, it was decided to review the recruitment strategy. Accordingly, the study sites were visited and invitations posted on the notice boards of churches, hospitals and community centres in those areas. In addition, laminated prints of the invitations were tied to numerous streetlight and telephone poles in those areas. The locations chosen were within or as close to the target areas as possible and also easily visible to the people living in those areas. Small printed slips / tags with the venue and contact details for registering interest were also attached to the invitations for the people to take with them. Appendix C shows copies of the invitation for a focus group, the small printed slip / tag and some photographs of the advert.

When registering interest in attending the focus group discussions, most of the participants mentioned that they saw the invitation on the street poles, indicating that this was an effective method for reaching the target population. The response to the

invitations was much higher than expected. Further, in almost all the events, more people than the registered number attended the events.

Accordingly, in addition to Callander and Stirling, focus group discussions were conducted in Stockbridge, Bonnington and Roseburn area near Murrayfield stadium in Edinburgh. Four focus group discussions were held in local churches and one each in a school and a local cafe. As shown in Table 4.2 a total of 69 people took part in the focus group discussions out of which 31 were males and the remaining 38 were females. The ages of the participants ranged from a minimum of 16 to a maximum of 81. The average age of the participants was 57.

Table 4.2: Focus group attendance details

Place	Number of participants
Murrayfield, Edinburgh	18
Stockbridge, Edinburgh	15
Bonnington, Edinburgh	14
Callander	08
Stirling	14
Total	69

The large group sizes were mainly due to the above discussed unique recruitment strategy. Although not everybody was able to fully contribute their views in the large group, nonetheless a lot of useful information was gathered. The carrying out of individual interviews (see section 4.6) also helped to compensate for the large size of some of the groups, since this allowed individual perspectives to be explored in more depth.

4.7.3 Conducting the focus group discussions

In addition to the instructions and information provided to the one-to-one interview participants (see section 4.6.3), the focus group discussion event participants were informed that their own views before joining the event were important but they could be informed by what others said if it reminded them of something. The discussions lasted for about an hour and half and included a short break for refreshments.

As in the case of one-to-one interviews, the proceedings of the focus group discussion events were digitally recorded for later transcription and participants were requested to fill up sheets containing questions related to socio-demographic data. Section 4.8.3 provides further details about the tools and techniques used for the analysis of data collected during the focus group events whereas Chapter 6 presents the data analysis in detail.

4.8 Details of interviews of agencies

For interviews of the officers of the identified agencies, the selected agencies as listed in section 4.4 were contacted and requested to identify an officer each for an interview. Two communications officers from SEPA of which one was manager with flood risk communication responsibilities, one emergency planning officer / advisor from each of the councils, one fire & rescue station manager working in that service's Risk Management Department with responsibility for civil contingencies, and two police officers working in that service's Emergencies and Events Planning Department were interviewed for the research. After the initial contact, the officers were then contacted for a convenient time for the interview.

4.8.1 Design of interview guide

The questions posed to the agencies were aimed at eliciting information on their flood risk communication efforts, choice of media, and their future plans. Accordingly, the interview guides for the agencies concentrated on how the agencies perceived their legal responsibilities in relation to flood risk communication. Further questions elicited information on their activities and future plans related to flood risk awareness and warning and also whether the agency worked in partnership with other agencies and how they worked. To accommodate the special position of SEPA as 'the flood risk communication authority' in Scotland, the interview guide for SEPA was slightly different than that for the rest of the agencies. Copies of the interview guides for SEPA and that for the rest of the agencies are provided in Appendix D and E respectively.

4.8.2 Recruitment of the participants and conducting the interviews

An interview guide was emailed to the concerned officers about a week before the date of interview. The interviews were carried out in the meeting rooms of the offices of the

respective agencies and lasted for about an hour and half. As earlier, consent from the officers was sought before recording the proceedings of the interview.

The next section provides further details about the tools and techniques used for the analysis of data collected during the interviews of the officers of the identified agencies whereas Chapter 7 presents the data analysis in detail.

4.8.3 Analysis of qualitative data

All the digital recordings of the interviews and focus group discussions were transcribed verbatim and then checked for any errors. Qualitative analysis software nVivo 7® and MS Word® were used to perform qualitative data analysis using grounded theory approach. Grounded theory approach involves coding a dataset and generating concepts and / or categories and comparing the next dataset against those categories or concepts until theoretical saturation (which means that no more addition to the domain of the category or concept is being achieved by examining the datasets anymore) is reached. However, one can start with a pre-given set of codes which can be derived based on previous studies and literature (Zhang & Wildemuth 2009), and this approach was used for this research. Further, there are no clear guidelines in the literature as to what the appropriate unit of analysis should be for coding (Hruschka et al. 2004 and Kurasaki 2000 cited in Campbell et al. 2013) but the most common practice is to use either clearly demarcated text or 'units of meaning'. Using 'units of meaning' for coding has been known to be advantageous because it is less likely to decontextualise responses or data (Garrison et al. 2006 cited in Campbell et al. 2013) and therefore this method of coding was used for this research. The coding scheme used for the research is presented in Appendix F.

Literature review about validity and credibility of the outcomes of a qualitative analysis exercise reveals that in addition to issues of ethics, 'bias' and the level of 'objectivity' or 'critical spirit' of the researcher remain the central concerns, especially in relation to feminist, ethnic and insider-outsider research. The aforementioned concerns emanate from the very fact, and also a major constraint, that there is no other method or technique of doing research other than through the medium of the researcher (Stanley and Wise 1993 cited in England 1994). A researcher is positioned by her/his gender, age, 'race'/ethnicity, sexual identity, and so on, as well as by her/his biography, all of

which may inhibit or enable certain research insights (Hastrup 1992 cited in England 1994) and influence produced knowledges (Clifford & Marcus 1986, Haraway 1988 and Hartsock 1987 cited in Agyeman, 2002). In simple words, qualitative analysis is an interpretative process, and despite use of rigorous approaches, the preconceptions, assumptions and 'worldview' of the researcher are likely to influence the process and any emerging theory (Lacey & Luff 2001). This appreciation is acknowledged by making the researcher more 'visible' through inclusion of a reflexive account of the researcher. It has been recommended that the reflexive account shall give specific attention to position and relevance of the researcher's attributes and their likely influences on the research outcomes and process (Walford 1998 cited in Allies 1999). This research thesis presents such an account by the researcher and is included as Appendix-G in this thesis.

The qualitative analysis of the data collected during the one-to-one interviews of the public and focus group discussions is presented in Chapter 6 whereas Chapter 7 presents the qualitative analysis of the data collected during interviews of the officers of the selected agencies.

4.8.4 Further analysis – triangulation

Both the research strategies, quantitative and qualitative, were employed for this research which collected data from the communities living in the selected study sites using three different methods: postal surveys, interviews and focus groups. These data were analysed by employing appropriate tools and techniques as detailed in sections 4.5.5 and 4.8.3 respectively. However, as discussed in section 4.2, findings of a multi-strategy multi-method research could be used to corroborate research findings of the individual research methods and the findings also could complement each other. This analysis technique is known as triangulation in the field of social research. Further analysis was carried out using this technique which is presented in detail in Chapter 8.

4.9 Summary

Establishing an appropriate research design, which consist of identification of research strategy, research methods and data analysis techniques which are congruent with research objectives, is an essential prerequisite for successfully carrying out social research. This chapter provided justification of the chosen research stance, research

paradigms, research strategies and research methods. The chapter then provided justification and details of the study sites selected for the research, the process of recruitment of the participants, how the research instruments were administered to collect data and how the collected data was proposed to be analysed.

The next chapter, Chapter 5 presents the exploratory quantitative analysis of the survey data whereas Chapter 6 presents the analysis of the qualitative data collected during the one-to-one interviews and focus group discussions with the members of the communities. The qualitative analysis of the interviews of the agencies is presented in Chapter 7. The triangulation analysis which is carried out using both these quantitative and qualitative data is presented in Chapter 8. Finally, Chapter 9 presents the conclusions, policy implications of the research and recommendations for an improved flood risk communication strategy.

Chapter 5
Exploratory Interpretation of Postal Survey Data

5.1 Introduction

Following the adopted research methodology (see section 4.2) postal surveys were carried out in selected areas to collect data from the communities for this research. Section 4.5 provides details of the design of the postal survey questionnaire and the adopted survey methodology whilst section 4.5.5 details the tools and techniques adopted for analysing the postal survey responses. This chapter presents the analysis[11] of the postal survey responses. It should be noted that this chapter only presents the exploratory analysis of the data which was 'received', with only some scope of understanding the reasons behind why the data generated such outcomes. As discussed in section 4.2.4, interviews and focus group discussions, presented in the next chapter, have the capability to elicit reasons behind such outcomes.

The analysis is presented in sections 5.2 to 5.8. Section 5.2 presents demographics of the survey respondents. Section 5.3 presents analysis of responses to questions which were aimed at establishing knowledge of the communities about flooding whereas section 5.4 presents analysis of responses which were aimed at establishing the sources of information of the communities, their level of satisfaction about the information and what further information they sought to increase their awareness about flooding. The analysis presented in section 5.5 relates to patterns of media usage of the communities as well as issues related to their use of certain media for flood risk communication. Section 5.6 provides analysis of the media preferences of the communities for flood risk communication. Section 5.7 presents analysis of the effect of socio-demographic factors and section 5.8 presents further analysis in view of the theoretical considerations. Finally the last section, section 5.9 summarises of the chapter.

[11] 'Analysis' in the context of the quantitative data presented in this chapter and rest of the thesis relates only to exploratory analysis presenting *descriptive analysis* or exploratory analysis only, with no *inferential analysis* having been undertaken.

5.2 Demographics of the respondents

A total of 547 respondents recorded their ages. The following pie chart, shown in Figure 5.1, categorises the recorded ages in groups.

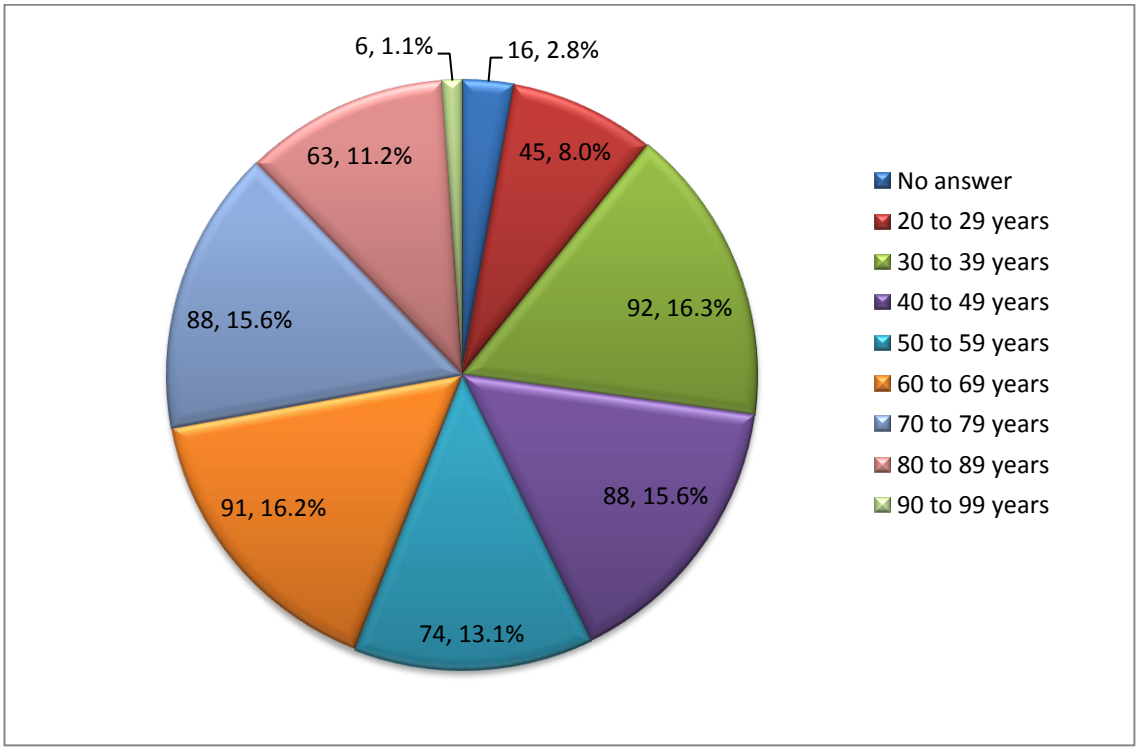

Figure 5.1: Age distribution of the postal survey respondents

It is evident from the pie chart that the survey received a good response from all the age groups. Although the response rate of the age groups 20 – 29 years, 80 – 89 years and 90 – 99 years was comparatively less than the response rate of the other age groups this is compensated to some extent by one-to-one interviews with individuals aged 20 -29 years.

Out of the 563 respondents who recorded their gender, at 57.9% (326 responses), female respondents were slightly more in number than the male respondents (41%, 231 responses); 6 respondents did not record their gender.

5.3 Knowledge about flooding

The significance of prior knowledge, in the form of understanding and awareness, in developing risk perception and thus risk management was stressed in section 3.2. The following analysis, presented in subsections 5.3.1 to 5.3.5, assesses the level of

knowledge the survey respondents had about flooding related issues and matters in their areas. This is achieved by analysing the responses to questions on level of perceived risk of flooding; causes and sources of flooding; effects of floods on property, possessions and lives; action taken to limit impact of floods by the respondents and whether they had a plan for action in a flood event.

5.3.1 Level of flood risk to the area

Figure 5.2 shows the level of risk perceived by the respondents.

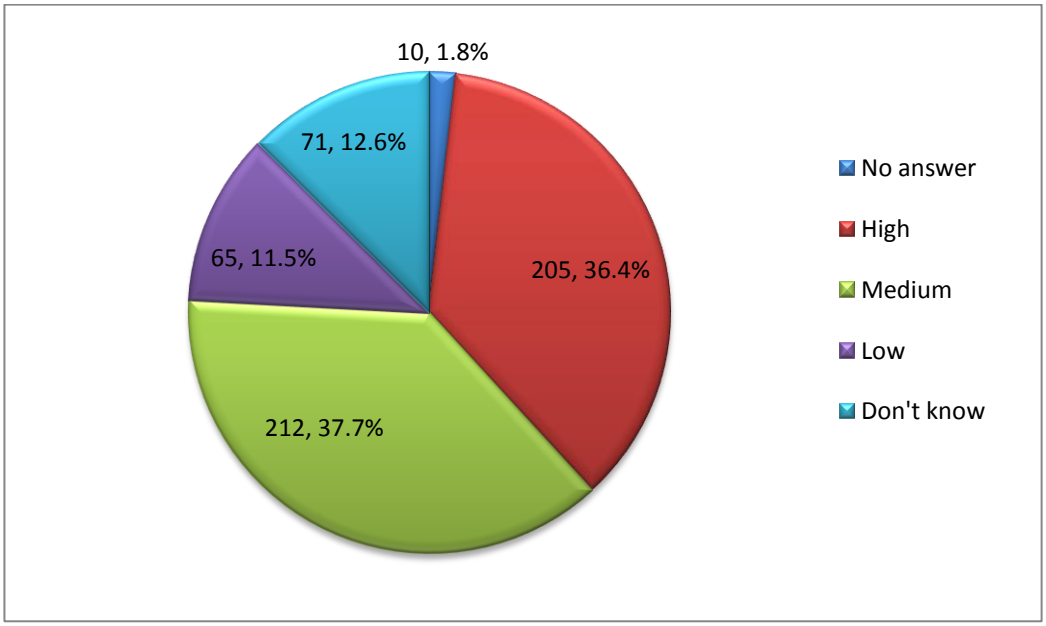

Figure 5.2: Level of flood risk to their area as perceived by the postal survey respondents

As can be observed from Figure 5.2, the majority of the respondents perceived that the flood risk to their area was either medium (37.7% of the respondents) or high (36.4% of the respondents). It is also noteworthy that 11.5% of the respondents thought that the flood risk to their area was low whereas 12.6% of the respondents indicated that they did not know the level of risk to their area. From this analysis, it is clear that the views of the respondents are different than the views of the risk assessors or the agencies responsible for flood risk communication. It is also significant to note that more than 12% of the respondents did not know the level of risk of flooding.

However, the above findings can be explained in light of the criteria used for selecting the study areas. As stated earlier, the households for the postal survey were selected

based on the 'etic' perspective of risk of flooding i.e. the areas identified by flood risk mapping carried out by scientists and published by SEPA. The flood risk mapping does not attribute a level of flood risk to an area apart from categorising them as being susceptible to flooding in a 1 in 200 year probability flood scenario. Further, the caveats accompanying the publication of maps state that it is a high level assessment, and hence indicative only, in the sense that there are many technical uncertainties associated to the mapping. Therefore, it is not unsurprising that the views of the respondents on levels of flood risk may vary from those of the scientists. A further reason for the difference in perceived level of risk of flooding may be due to the respondents denying the risk or thinking so because of some other reasons such as location of their property in relation to the source of flood risk or because of other factors (see section 3.2) which affect their risk perception.

In summary, since about three quarters of the respondents identified that the risk to level was high or medium, this demonstrates conformity with the etic perspective of estimated risk of flooding in these areas. However, not all the population was aware of the risk of flooding to their area. This finding thus has significance for the framing of a flood risk communication strategy.

5.3.2 Causes and sources of flooding

As explained above, the etic perspective of risk of flooding so far has been limited to the flood risk mapping carried out by SEPA. The sources of flooding for their analysis is limited to watercourses (small to large rivers) and coastal flood risk whereas the questions for the current analysis were based on the sources of flooding in the UK identified in the literature (see section 2.2.2). Since this was a multiple choice question, some of the respondents identified more than one source of flooding. From Figure 5.3, it can be observed that high river water levels and overloading of drains were perceived as likely sources of flooding by the majority of the respondents. In addition, it should be noted that other reasons such as mismanagement of reservoirs in the upstream and poor maintenance of the drains were also identified as potential sources of flooding in their areas even though these were not specifically mentioned as an option in the questionnaire. These responses were collated from the basic information sheet enclosed with the questionnaire which provided a space for comments and additional information which a respondent wished to provide.

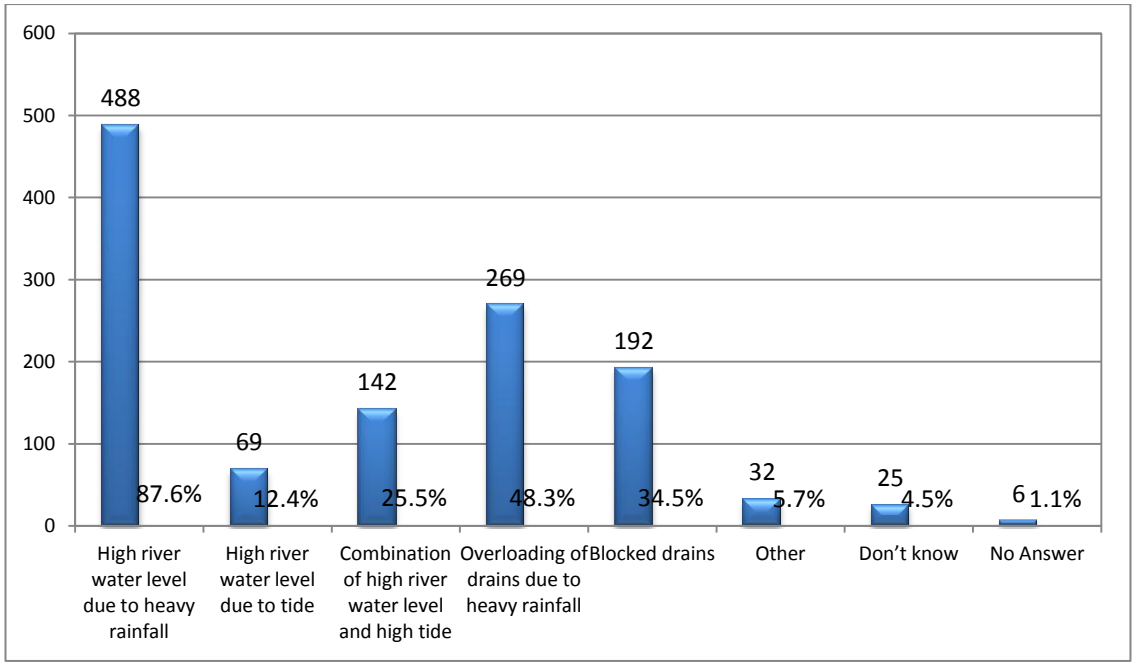

Figure 5.3: Sources of flooding in their area as perceived by the postal survey respondents

The above analysis indicates the limitations of the flood risk assessment carried out by SEPA which considers only river and coastal flooding. It also highlights the responsibility of the agencies which maintain drains or the sewerage and drainage systems to manage flood risk. The Flood Risk Management (Scotland) Act identifies Scottish Water and the Local Authorities for this assessment and maintenance of the sewerage and drainage systems which can be said to be a right step in this direction. However, the responsibility does not cease at this juncture: it is essential that any subsequent analysis of flood risk gives due considerations to these findings and the flood risk communication strategy is updated to include sources of flood risk in addition to fluvial and coastal flooding.

5.3.3 Effects of floods on property, possessions and lives

The effects floods can have on property, possessions and lives were discussed in section 2.2.3. This question explored the respondents' perceptions of likely effects on their property, possessions and lives if a flood were to occur in their area. From the responses as shown in Figure 5.4, it can be observed that the majority of the respondents perceived that floods can have an effect on their property, possessions and lives. Damage to their house (54.8%) and loss or damage to furnishings and internal appliances (49.7%) were perceived to be the likely effects by majority of the

respondents while damage to non-replaceable sentimental items and physical or mental stress were also thought to be the likely effects by 36% of the respondents.

It is worth noting that a small percentage (8.8%) of the respondents did not know about the likely effects of a flood event in their area. Therefore, flood risk communicators should not assume that the public is aware of the consequences of flooding and be complacent in raising awareness on this issue. Further, 18.6% of the respondents indicated 'Other' effects where they mostly indicated that they lived on the upper floors and therefore were less likely to be affected directly. However, some of these respondents indicated the possibility of some damage to buildings and restricted access to their flats. In summary, it can be concluded that most of the respondents have understanding of the effects of floods on property, possessions and lives and their views closely match with the literature on this topic. However, it would be worth finding out why 23.4% of the respondents did not think that flooding would not cause any damage to their house.

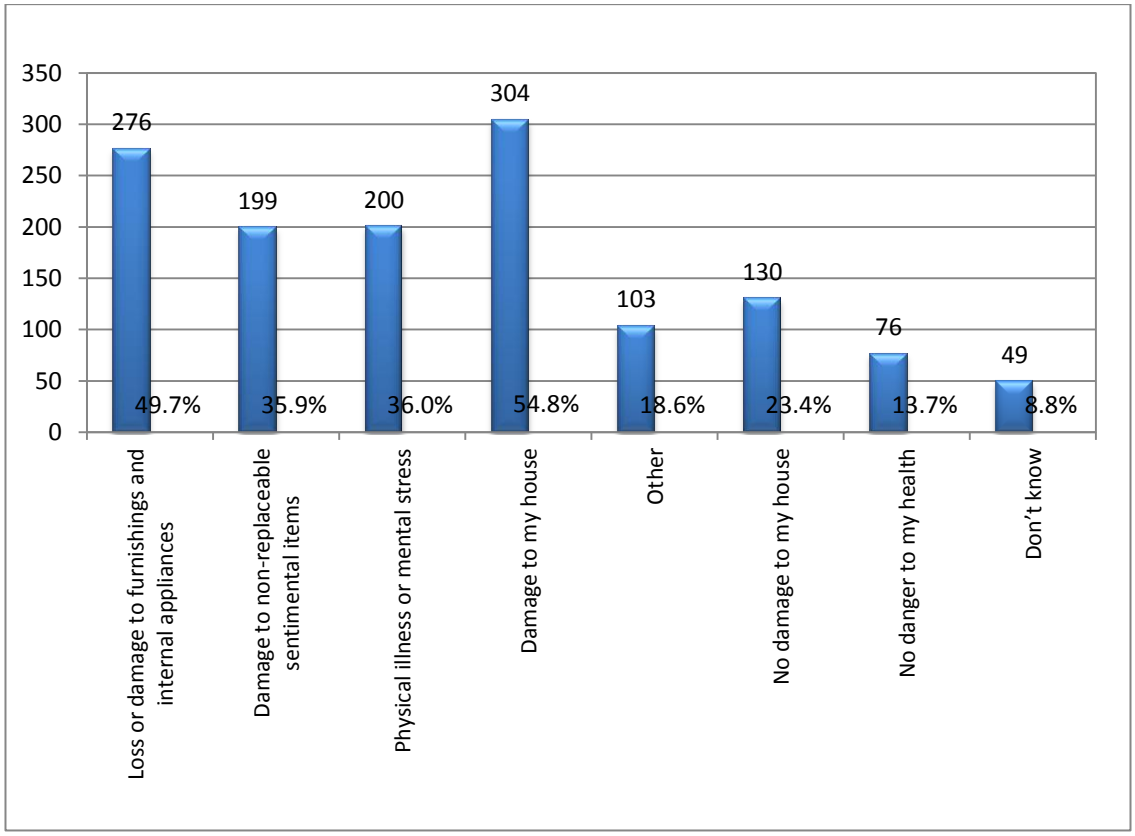

Figure 5.4: Perceived damage to property and possessions due to floods as perceived by the postal survey respondents

5.3.4 Action taken to limit impact on family

It is significant that 30 out of the 563 respondents did not provide an answer to this question. Out of the recorded responses, 5.1% respondents did not know whether they had taken any relevant action. From the responses as shown in Figure 5.5, it can be observed that only less than a quarter (23.6%) of the respondents indicated that they had taken some action to limit the impact of floods on their families. The percentage of respondents at 71.3% who answered that they did not take any action to limit the impact of flooding on their families, is surprising when compared to other findings, for example, about 74% of the respondents perceived their area to be at medium to high risk of flooding (Figure 5.2), about 77% of the respondents owned their properties (Figure 5.16), about 39% of the respondents had previous flood experience and about 62% of the respondents had been living at their current properties in flood risk areas for more than 5 years (Figure 5.18).

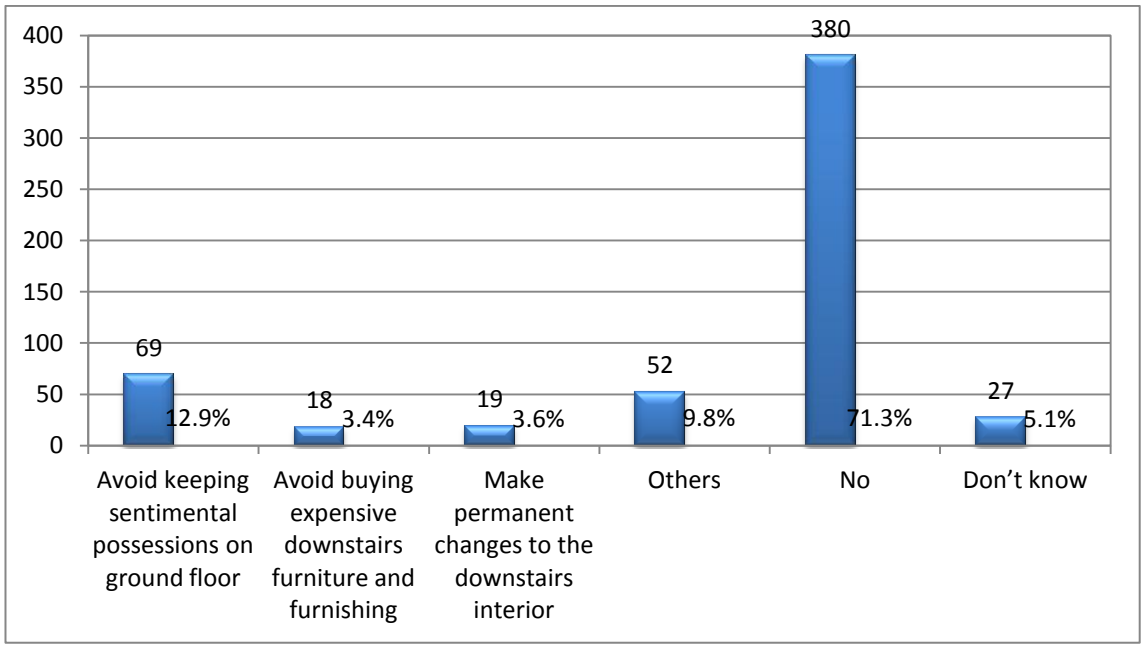

Figure 5.5: Type of action taken by the respondents to limit an impact of floods on their families

5.3.5 Plan for action

Following a similar trend as above, as shown in Figure 5.6, it can be observed that 65.2% respondents answered that they did not have a plan for action in the event of a flood and a further 10.5% were unsure if they had a plan for action.

Only 22.4% respondents answered that they had a plan for action in the event of a flood which is similar to the finding that only 23.6% of respondents had taken some action to limit the impact of floods on their families.

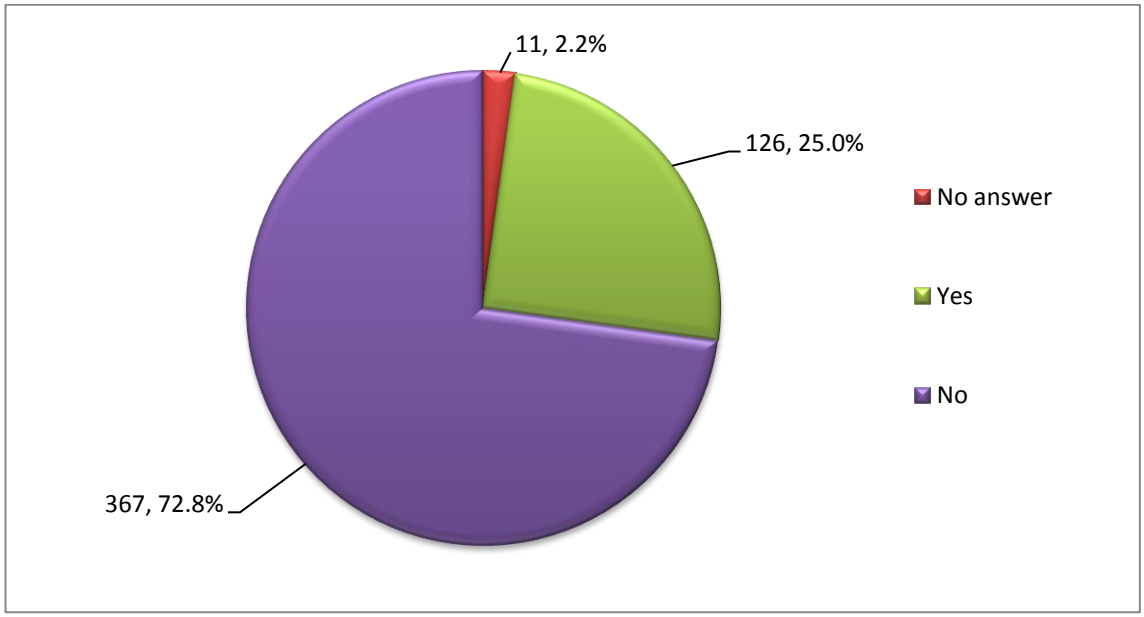

Figure 5.6: Distribution of perception of the respondents to indicate if they have a plan for action in the event of flooding

From the analysis so far it can be concluded that the majority of the community members understand how flooding as a risk may affect them but most of them have taken neither any preventive or protective action nor do they have a plan for action should a flooding emergency arise.

5.4 Information about flooding

Section 3.2 also highlights the role of information availability in affecting flood risk communication and hence flood risk management. The following sections explore the sources of flood awareness and warning (section 5.4.1) of the respondents, their level of satisfaction about this information (section 5.4.2), what further information they sought to raise their awareness about flooding (section 5.4.3) and whether they had received any flood warnings in the past and what action they took on receiving flood warnings (section 5.4.4).

5.4.1 Sources of flood awareness and flood warning information

Figure 5.7 shows that weather forecasts on TV (53.9%) and weather forecasts on radio (32.5%) as well as news in newspapers, on radio and TV (35.8%) were major sources of flood awareness and flood warning information for the respondents. Interpersonal communication too played a noteworthy role as it can be observed that neighbours, local residents, friends and relatives had been identified as information sources by 42.2% respondents. 31.6% respondents identified local public meetings & exhibitions as their sources for flood awareness and flood warning information. It can also be noted here that the sources of information were not new media (for example a website) but traditional media (for example radio and television).

As noted earlier, SEPA acts as Scotland's flood risk communication authority (see section 2.5.1). It undertakes flood awareness raising and warning activities and also publishes flood risk related information on its website. However, from the responses shown in Figure 5.7, it can be observed that SEPA was identified as the source for flood awareness and flood warning information by only 13.9% to 14.9% of the respondents.

The above findings demonstrate a clear absence of 'official information' sources such as SEPA and the prevalence of traditional media like interpersonal communication, radio and television. This has significance for SEPA in indicating the need to publicise the agency further. It also indicates that SEPA's use of media to reach the population at risk of flooding needs to be reviewed. This will be further discussed in sections 5.5 and 5.6.

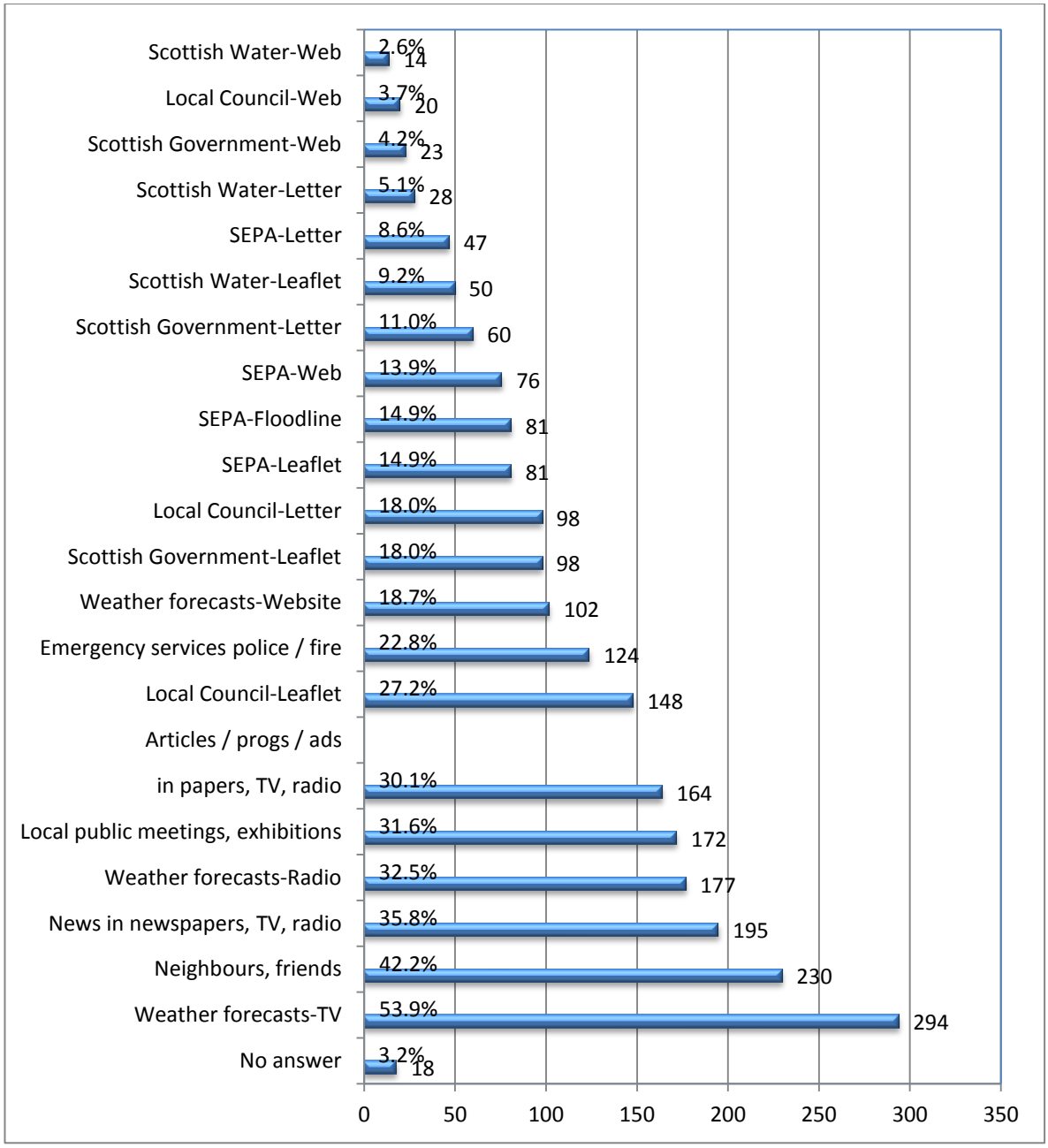

Figure 5.7: Information sources for flood awareness and flood warning as identified by the postal survey respondents

5.4.2 Level of satisfaction about flood related information

There were two parts to this question: how easy the information was to understand and the availability of the information. A total of 30 respondents did not provide any answer to the first part of the question and a total of 62 respondents did not answer the second part of the question.

As can be observed from Figure 5.8, about 39% respondents reported being 'quite satisfied' and about 34% respondents 'neither satisfied not dissatisfied' about how easy the flood-related information was to understand. Further, about 28% respondents reported being 'quite satisfied' and about 36% respondents 'neither satisfied not dissatisfied' about how easily the flood related information was available.

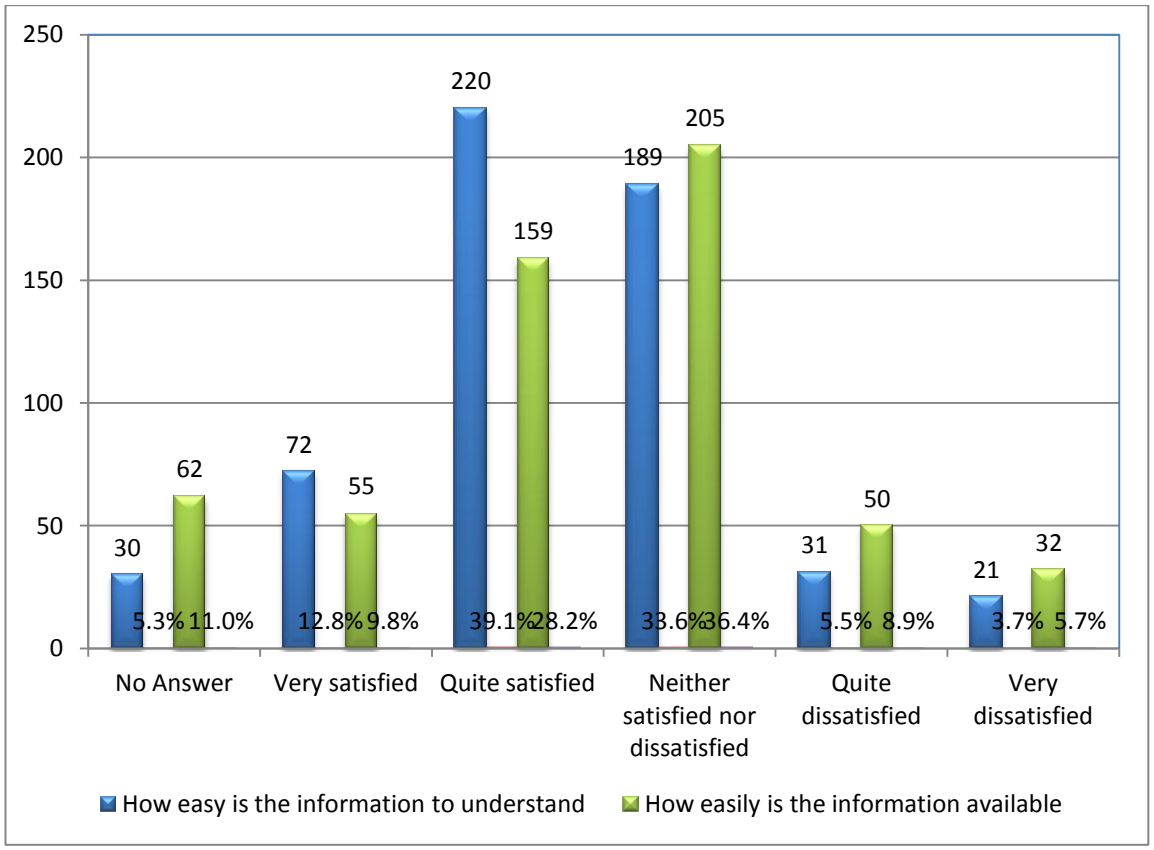

Figure 5.8: Distribution of level of satisfaction about flood related information among the respondents

Thus, it can be seen that only slightly 50% of the respondents expressed some degree of satisfaction over how easy the information was to understand and only slightly 35% of the respondents expressed some degree of satisfaction over how easily the information was available to them. As found in the previous subsection, SEPA was identified by less than 15% of the respondents as a source of information. These findings, thus, mean that SEPA not only needs to improve the reach of the information but also how it is presented.

5.4.3 Information sought to raise awareness about flooding

This section presents analysis of data relevant to the type of information sought by the communities to help in raising their awareness about flooding. As shown by the categories highlighted with red border in Figure 5.9, it can be observed that the level of risk and the actions they should or should not take in flood emergencies were major concerns.

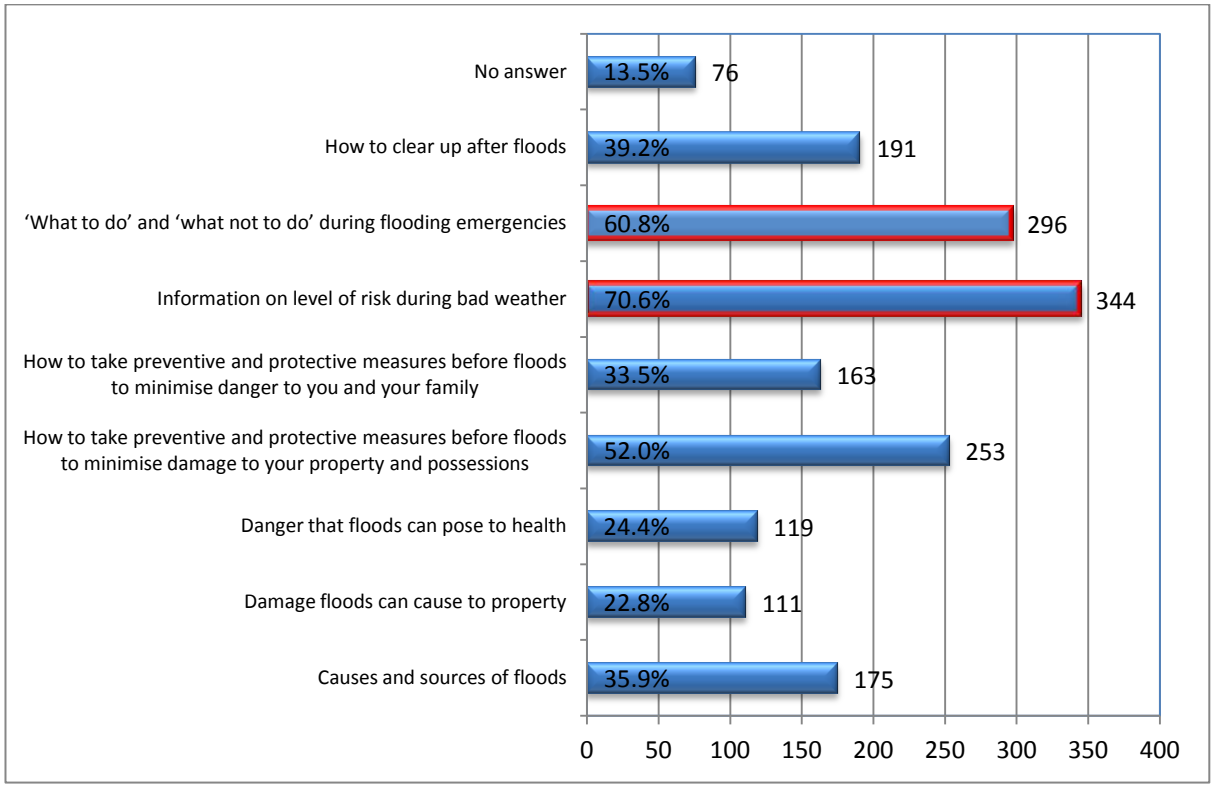

Figure 5.9: Further information sought by the respondents to help them raise their awareness about flooding

It is also noteworthy that although section 5.3 indicates the prevalence of a general satisfactory level of knowledge on flooding, more than 50% to 70% of the respondents sought information on preventive and protective measures, actions they should or should not take as well as property level preventive and protective measures. This finding although surprising in relation to level of knowledge about flooding, may be attributed to factors such as their confidence in the information they held,

5.4.4 Flood warning and action taken

This question elicited information about how many respondents had received flood warnings, from whom, and whether they had taken any action as a result. As can be observed from Figure 5.10, only 161 out of the 563 respondents (28.6%) indicated that they had received any flood warning.

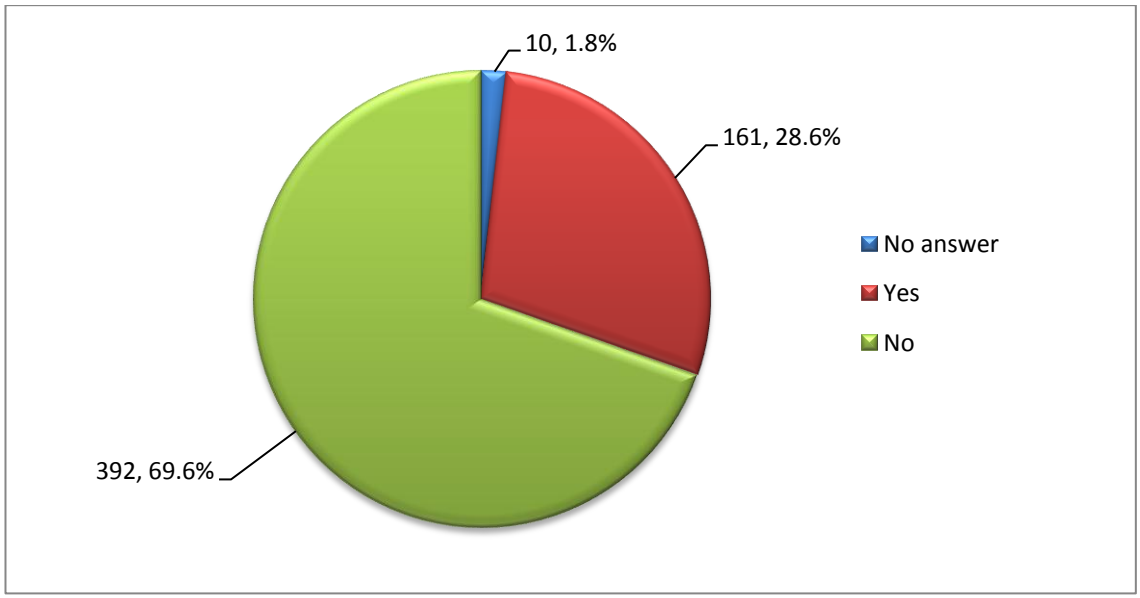

Figure 5.10: Distribution of postal survey respondents who received a flood warning

These 161 respondents provided 167 responses to the multiple choice question asking them to identify the source they received a flood warning from. The responses are displayed in Figure 5.11. This shows that the largest number of responses (44.2%) to this question indicated that their source of flood warning was 'Other'.

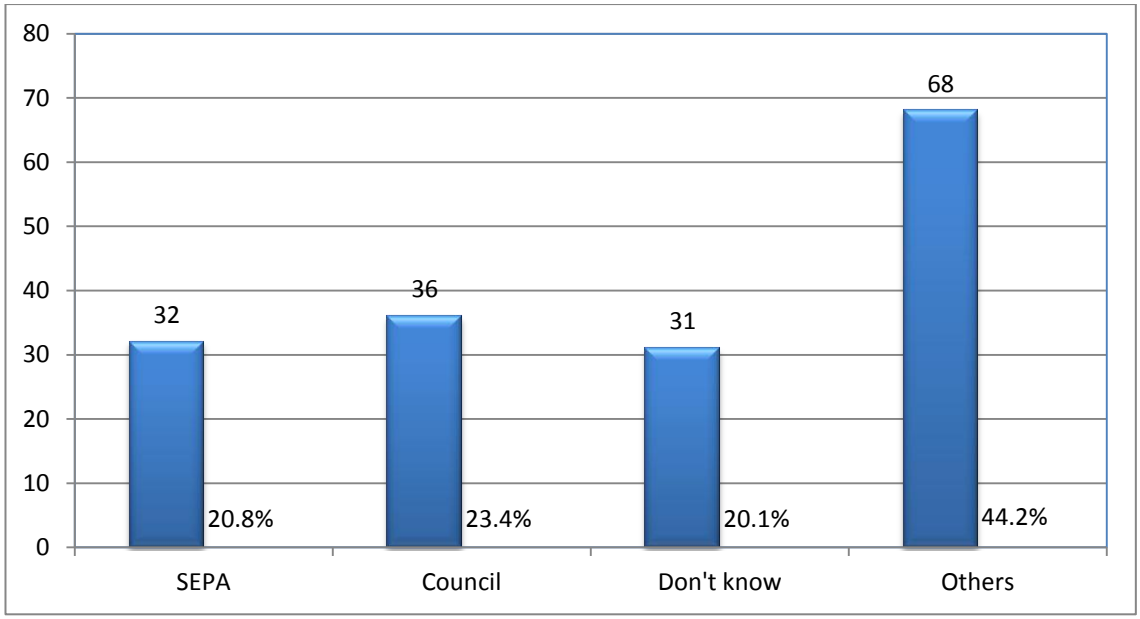

Figure 5.11: Flood warning source from the postal survey responses

The breakdown of the responses under 'Other' is shown in Table 5.1.

Table 5.1: Breakdown of responses to choice of 'Other' as flood warning source

Flood warning sources	Number of responses
Police	42
Police & Emergency Services	3
Emergency Services	2
Fire Services	2
Email at work	1
Housing association	10
Neighbours	5
Not specified	3

From the information presented in Figure 5.11 and Table 5.1 reveal that 'Police' were by far the most commonly specified source for flood warning. This outcome was not anticipated before the survey since SEPA is well recognised as 'the flood warning authority' in Scotland (see section 2.5.1). Only about a fifth of the respondents mentioned that they had obtained flood warnings from SEPA and these constituted only about 6% of the total number of respondents.

Out of the 161 respondents who recorded that they had received or obtained flood warnings, 105 respondents recorded that they had taken some sort of action. The respondents were asked to specify the type of action they had taken after receiving a flood warning. Analysis of the responses showed varied responses to protecting property, possessions and lives.

Respondents used metal barriers or sandbags or even dug out sods from the garden to block water entry paths into the property. They switched off utilities, moved or helped others to move valuables, furnishings, computers and important possessions like photos and certificates upstairs or out of the property to a safer place away from flood waters. Some respondents recorded that they moved their cars and dogs, stayed with their families, prepared to get evacuated with necessary clothing and medications, were evacuated or helped others to evacuate. Sadly one respondent recorded that he had lost everything. It is also noteworthy that some respondents also took precautionary actions well in advance, for example, repairing or building boundary walls, buying flood barriers, making changes to property on ground floor / basement to much simpler actions like occasionally checking torch-lights and wellington boots.

This analysis thus highlights the role police play in issuing flood warnings while highlighting the lack of reach of SEPA in communicating flood warnings. The analysis also suggests that most people (105 out of 161) reacted to the flood warnings appropriately with a range of protective and preventive measures. Improving the reach of flood warnings can, therefore, be seen to mitigate the impact of floods on communities. Finally it should be noted that almost 35% respondents did not act on receiving flood warning. The reasons for this are explored further through qualitative research.

5.5 Media issues and usage pattern

The question investigating the media usage pattern of the respondents and issues associated with the use of media consisted of six sub-questions. This is the section of the questionnaire to which the least responses were provided. However, the number of responses is still substantial. The distribution of the responses is shown in Table 5.2. It can be observed that television, radio, internet and telephone calls were the most

frequently used media. Further, it can be observed that e-mail, text message as well as newspapers were also substantially used by the respondents.

Table 5.2: Media usage pattern of postal survey respondents

Media	Non - availability	High cost	Technical or personal difficulty	Privacy	Other	Daily used
Newspaper	26	17	5	2	27	206
Brochures or leaflets	13	2	3	1	12	70
Television	44	13	5	1	15	300
Radio	18	4	2	1	10	263
Internet	118	31	52	8	27	237
Email	110	28	45	19	22	229
Phone call	37	14	11	32	10	237
Text message	93	27	41	35	21	189
PAS	149	10	14	22	16	14
Exhibitions, seminars	102	10	23	3	31	14
Visit to property	78	6	9	59	8	23

From Table 5.2 it is also evident that some respondents did not use internet, email and text messaging because of non-availability, high costs as well as technical or personal difficulty in using them. Among all the media, visit to property was noted to cause privacy issues by the most number of respondents. Use of email, phone calls, text messaging and a public announcement system were also considered to raise privacy issues. It can also be observed that all of the media were not used by some of the respondents due to some other issues (see responses in column ‘other’) which were different to non-availability, high costs, technical or personal difficulty in using them and privacy intrusion considerations. The distribution of the media used by respondents on a day-to-day basis is shown in Figure 5.12.

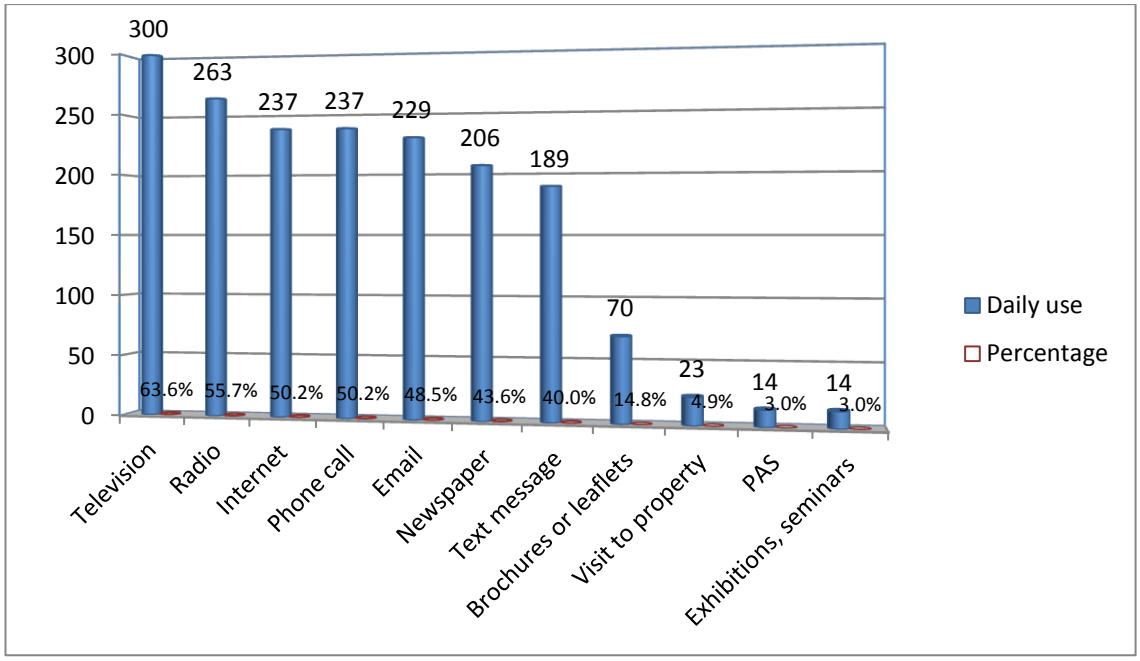

Figure 5.12: Distribution of the media used by postal survey respondents on a day-to-day basis

From the above analysis it can be concluded that the media usage of the respondents varied widely due to a number of factors, such as non-availability, high costs, technical difficulty in using them and privacy intrusion considerations. Thus, it is inevitable that using only a specific media would result in reaching only a limited section of the population and therefore a range of media should be employed for flood risk communication. This needs to be given due consideration while planning and developing a flood risk communication strategy, including assessing the media preferences of the communities at risk of flooding for flood risk communication. This is discussed in the next section.

5.6 Preferred media for flood risk communication

While highlighting the role of media in risk communication, section 3.4 pointed out that better communication performance results from matching specific media to specific communication tasks and that 'flood risk awareness' and 'flood risk warning' are two subtasks of 'communicating flood risk' which is the overall communication task discussed in this thesis. The question aimed at investigating the preferred media for flood risk awareness and for flood warnings consisted of two sub-questions; the first elicited information on the preferred media for flood risk awareness and the second on the preferred media for flood risk warning. The responses for the first sub-question are presented in Table 5.3:

Table 5.3: Most preferred media by the postal survey respondents for flood awareness

Media	Preference 1	Preference 2	Preference 3	Total responses
Newspaper	50	44	52	146
Brochures or leaflets	157	41	30	228
Television	119	98	58	275
Radio	61	98	55	214
Internet	43	59	40	142
Email	38	59	44	141
Phone call	15	39	35	89
Text message	20	10	24	54
PAS	11	17	22	50
Exhibitions, seminars	4	12	33	49
Visit to property	30	26	60	116

From the column 'Total responses' in Table 5.3 it is evident that the most preferred media with 275 responses was television. However, when seen in order of preference, it can be noted that 'brochures or leaflets' was recorded as the first choice by the most respondents. Television and radio were the next preferred media for flood risk awareness.

Worthy of note are the responses recorded for two media, exhibitions & seminars and visit to property. It can be noted that exhibitions & seminars was the least preferred media for flood risk awareness. Further visit to property, with 116 responses, was significantly preferred to media like phone calls, text messages, public announcement system as well as exhibitions & seminars. Also, it was not much far behind in terms of preference for media like newspapers, internet and email. This is worth considering in the light of earlier responses to a question which elicited responses on media raising privacy issues (see Table 5.2). It can be concluded that although visit to property was associated with privacy concerns, at about 20% of total responses favouring this option, it was also one of the preferred media by a significant proportion of the respondents. This needs to be given a due consideration while planning and developing a flood risk communication strategy.

The responses to the second sub-question which required respondents to report their most preferred media for flood risk warning are presented in Table 5.4.

Table 5.4: Most preferred media by the postal survey respondents for flood warning

Media	Preference 1	Preference 2	Preference 3	Total responses
Newspaper	22	27	37	86
Brochures or leaflets	40	24	22	86
Television	101	90	69	260
Radio	75	85	59	219
Internet	22	31	35	88
Email	43	44	43	130
Phone call	57	69	50	176
Text message	61	36	38	135
PAS	51	46	56	153
Exhibitions, seminars	1	1	3	5
Visit to property	70	46	52	168

From the column 'Total responses' in Table 5.4, it is clearly evident that television was the most preferred media for flood risk warning followed by radio and phone call. However, it can also be noticed that visit to property, despite being associated with privacy concerns (see Table 5.2) was also preferred by a significant proportion (about 30% of total responses) of the respondents.

A further analysis showing the media preferences for flood risk awareness and warning at a glance can be seen in Figure 5.13:

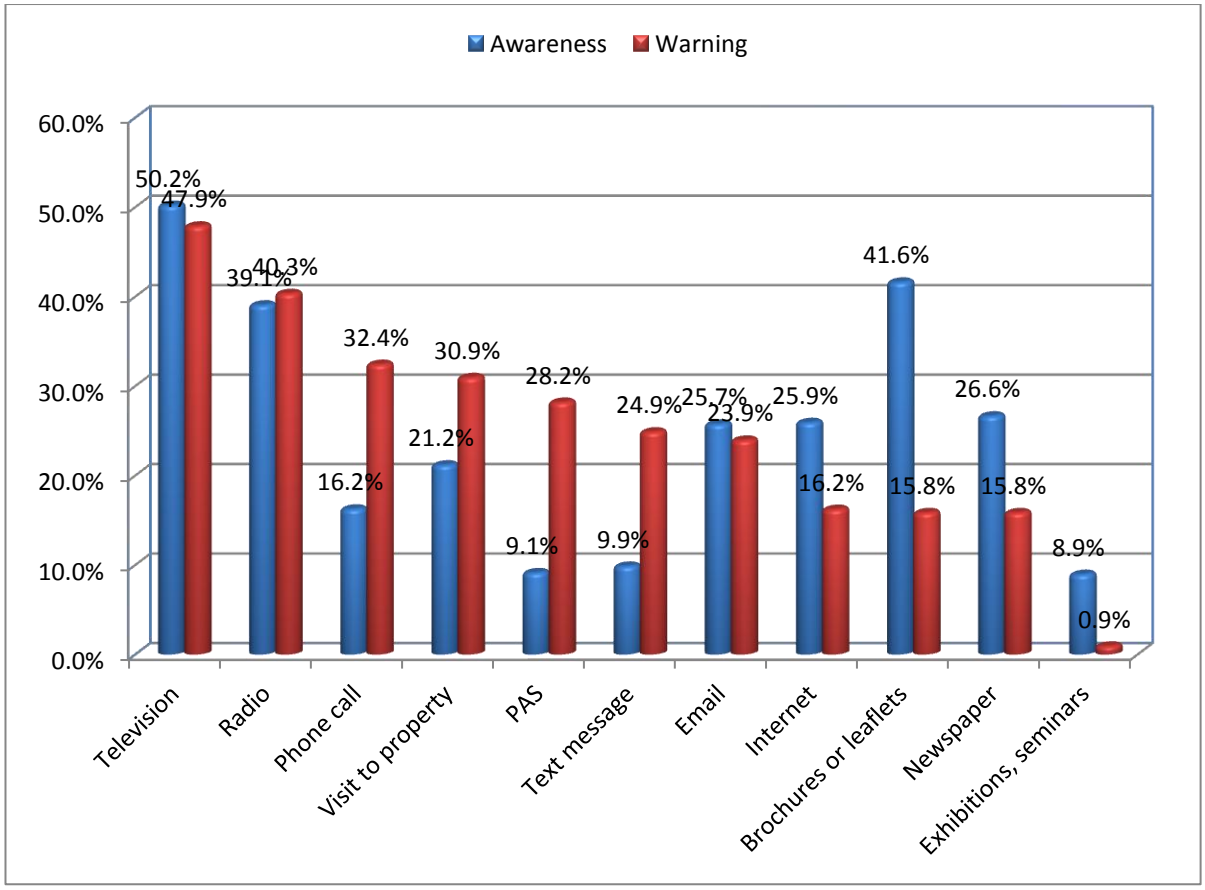

Figure 5.13: Preferred media for flood risk awareness and warning from the postal survey responses at a glance

From Figure 5.13, it can be observed that at an individual media level, television, radio and email were seen to be the preferred media by an equal proportion of the respondents for both flood awareness and flood warning purposes. However, again at an individual media level, a higher proportion of respondents preferred phone call, visit to property, public announcement system (PAS) and text messaging for warning purposes than for awareness purposes. Similarly, at an individual media level, a higher proportion of the respondents preferred internet, brochures or leaflets, newspapers and exhibitions & seminars for awareness purposes rather than for warning purposes.

The findings on the media usage pattern mentioned in the previous section suggested that a wide range of media should be used for flood risk communication and therefore suggested that an assessment of media preferences of the communities for flood risk communication would be beneficial for planning and developing a flood risk communication strategy. The findings presented in this section reinforce this argument

as the findings identify community preference of certain media for certain communication tasks.

5.7 Effect of socio-demographic factors

As discussed in section 3.2.4, socio-demographic factors like age, gender (Lindell & Whitney 2000; Heller et al. 2005), home ownership (Russell et al. 1995; Mulilis et al. 2000), length of residence at the same location (Dooley et al. 1992; Russell et al. 1995; and Tunstall et al. 1994; Fielding et al. 2002 cited in Tapsell & Tunstall 2008), and prior exposure to hazard and perceived risk (Drottz-Sjöberg 2000, Thieken et al. 2006; Zaleskiewicz et al. 2002; Heller et al. 2005 and Tunstall et al. 1994; Fielding et al. 2002 cited in Tapsell & Tunstall 2008) affect risk perception and hence risk communication. Presented below is analysis of the survey data to assess the effects of age on choice of information sources and media, and whether house ownership, length of stay and prior flood experience resulted in taking preventive and protective actions by the respondents to limit the impact of flooding on their property, possessions and lives.

5.7.1 Effect of age on choice of information sources and media

This section assesses whether age of the respondents had an effect on the choice of information source as well as media usage pattern and preferred media for flood awareness and flood warning. The top five most frequently used media used by all the age groups are shown in Figure 5.14.

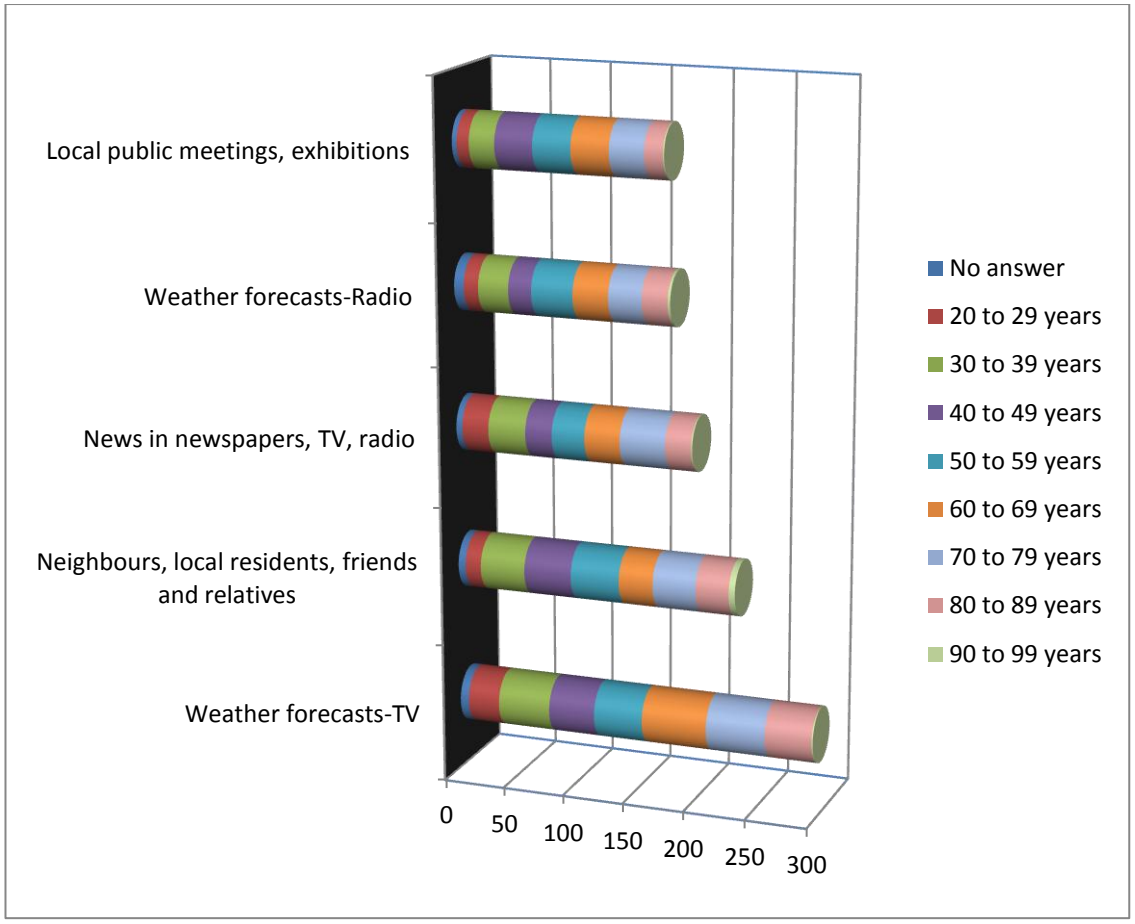

Figure 5.14: Information sources for flood awareness and flood warning distributed by age groups

From Figure 5.14 it can be observed that all the age groups have an almost even distribution across the various information sources although it can be noted that the first and the last age groups provided a much smaller number of responses which can be attributed to the smaller percentage of respondents in those age groups. A similar trend was observed for all other information sources, although not shown in this figure. Therefore, it can be concluded that age did not have an effect on the choice of source of information which the respondents were using for flood risk awareness and warning.

This section further assesses whether age was related to technical or personal difficulty one may experience in using a certain type of media. The 210 responses grouped by age for the question eliciting information related to this are shown in Figure 5.15.

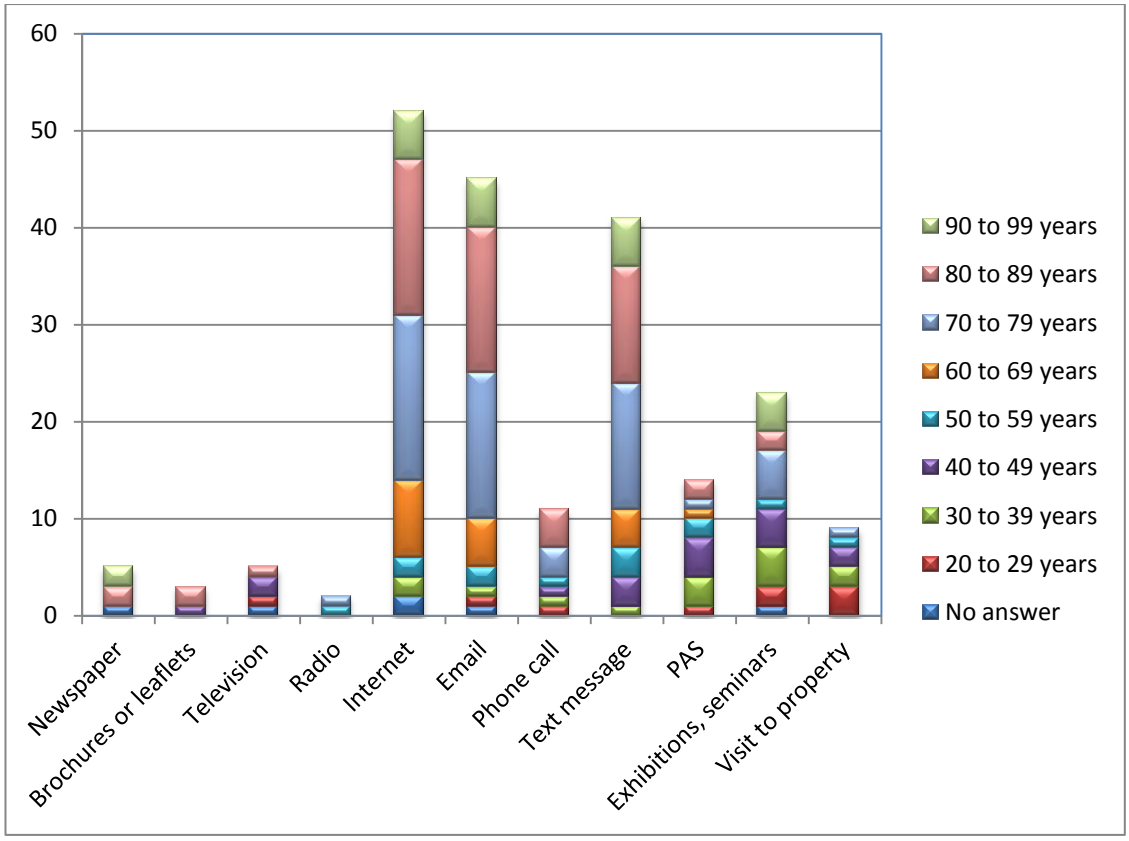

Figure 5.15: Media with technical or personal difficulty concerns grouped by age

From Figure 5.15 it can be observed that internet, email and text messaging were most commonly reported to be the media with concerns related to technical or personal difficulty in using them. It is also observed that this was mostly reported by respondents who were aged 60 or more. It can also be observed that exhibitions & seminars also had been identified by some age groups with concerns related to technical or personal difficulty in using them. This means that it may not be possible for some people to visit exhibitions, attend seminars or be present at home to receive flood risk related communication. Thus, it can be concluded that overemphasis on use of certain media, particularly internet, email and text messages, may risk the exclusion of elderly (people above 60 years according to age grouping in this research) from the communication process due to specific difficulties which are characteristic to that age group. This is a significant finding in view of the recent emphasis of many communication exercises, such as SEPA's Floodline, on posting information on the internet and using mobile text messaging for issuing flood warnings.

5.7.2 Home ownership

Kellens (2011) refers to studies (e.g. Burningham et al., 2008; Kreibich et al., 2009) which suggest that owning a property results in higher levels of perceived risk than renting a residence as home owners may suffer much more losses than tenants, particularly because a great deal of flood damage occurs to the building itself (Grothmann and Reusswig 2006 cited in Kellens 2011). Therefore, it would not be illogical to propose that house-ownership allows and motivates individuals to make modifications to houses and to take actions against flooding. These motivations for actions and modifications would naturally depend on their understanding and knowledge of risks. Their actions may threaten the structural integrity of their houses or affect well being of its occupants. Thus, this socio-demographic characteristic has a considerable significance from the flood risk point of view.

The distribution of the type of housing or house-ownership plotted from the data gathered for this research is shown in Figure 5.16. It can be observed that at 76.6%, the property ownership in the flood risk areas is higher than the Scottish average of 65.5% (as in 2003 according to the Office of the Deputy Prime Minister). The second largest group, which constituted 13% of the total responses, rented their properties privately. Only a small percentage of the respondents lived in public sector accommodation (for example council housing and housing association).

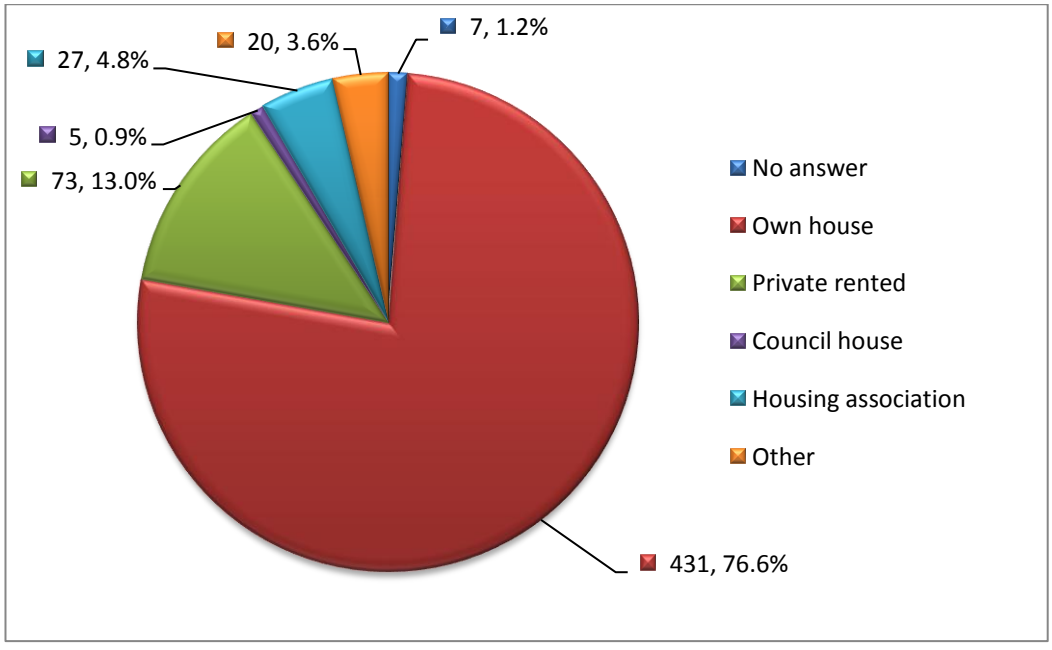

Figure 5.16: Housing type distribution of the postal survey respondents

A further analysis carried out by grouping the responses to the question on the preventive and protective actions against flooding provided by the respondents by type of housing is shown in Figure 5.17.

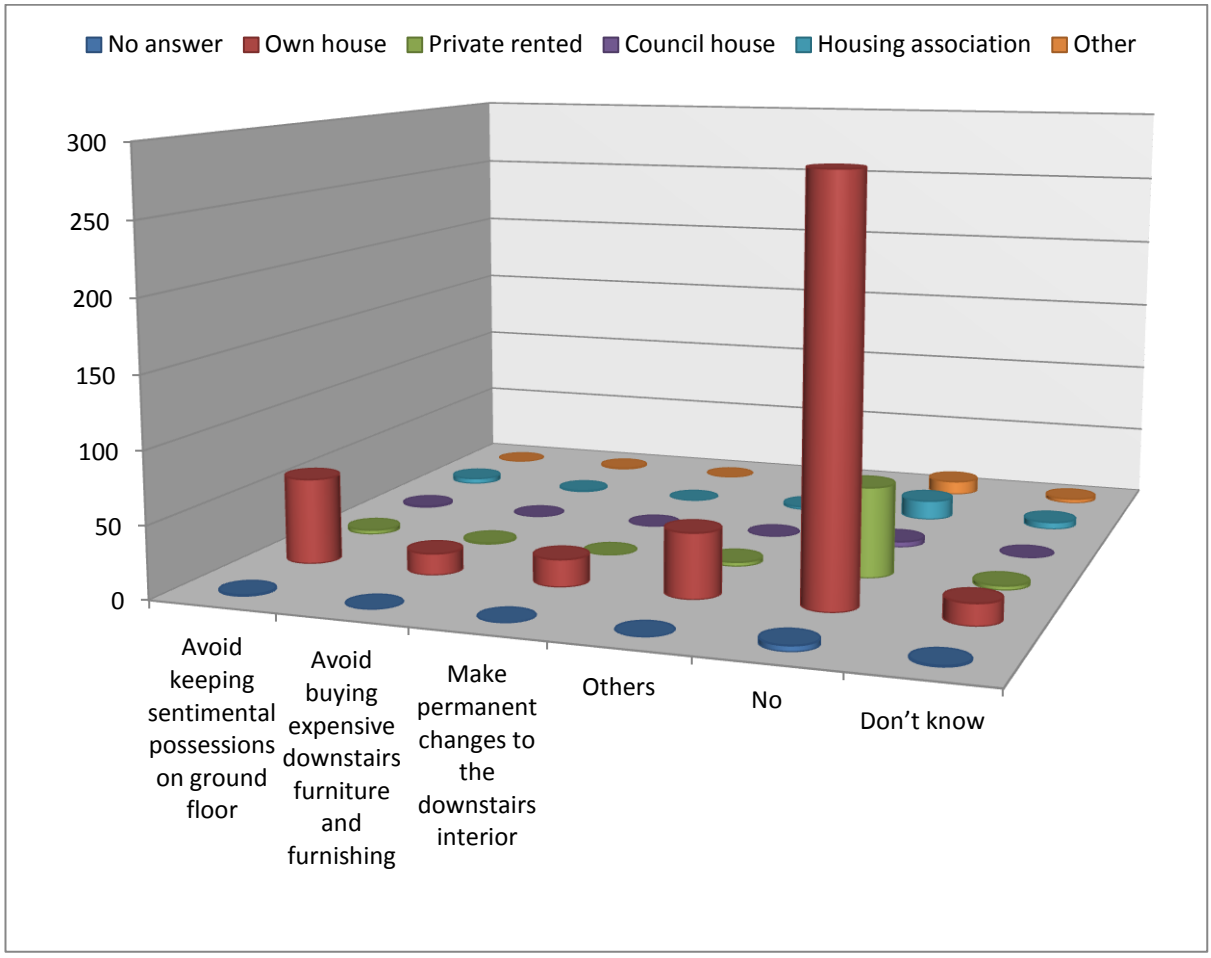

Figure 5.17: Action to limit impact of flooding on family grouped by type of housing

In line with the finding that the number of respondents with house ownership was significantly higher at 76.6%, from Figure 5.17 it can be anticipated that respondents who lived in their own houses would be more likely to take action than respondents who did not own their houses. However, disappointingly although over three-quarters of the respondents own their house, this was not the case.

As stated earlier in section 5.3.5 such unexpected findings pose methodological difficulties in investigating the reasons behind them. It was also stated that qualitative research better facilitates such an investigation. The analysis of qualitative data, as presented in the next chapter, indeed facilitated such an investigation.

5.7.3 Length of stay

On similar lines as 'home ownership', an extended length of stay in a particular area is expected to enhance the public's awareness and knowledge of risks which may threaten the structural integrity of their houses or affect well being of its occupants, and thus this factor too is expected to affect their motivations for relevant actions and modifications to houses.

Figure 5.18 shows the distribution of the length of stay of the respondents in their current residence.

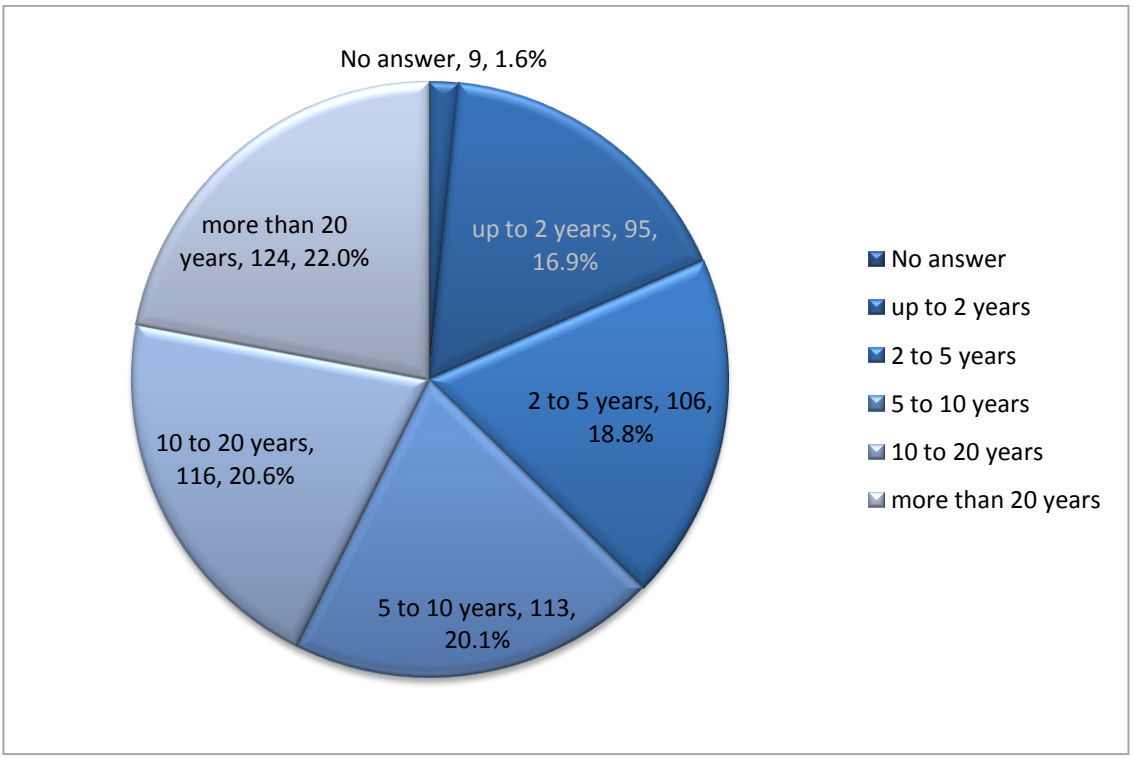

Figure 5.18: Length of stay at their current address of the postal survey respondents

It can be observed that with the percentage of respondents in each of the five groups ranging from 17%-22%, the respondents represented each group very well. It can be observed that over 60% of the respondents lived at their current address for more than 5 years. This is thought to be a sufficient time period to be aware of the risks the respondents may face in their area and to take appropriate preventive and protective measures. However, it was found that this was not the case. The qualitative analysis (see Chapter 6) explored the reasons behind this finding.

5.7.4 Previous flood experience

Literature indicates that prior exposure to hazard has a marked effect on perceived susceptibility and thus on risk perception (see section 3.2.2). It was highlighted that an appropriate perception of risk, together with other factors, governs the actions and motivations for protective and preventive behaviour against risks. The responses to the question enquiring previous flood experience indicated that 38.5% of the respondents (217 out of 563 respondents) experienced flooding in the last 10 years. Although unknown whether this is high or low compared to other parts of the UK, combined with prior findings on action taken, home ownership and length of stay, it nevertheless is an important finding thought to be worth investigating further.

It was anticipated that these respondents have a good understanding of the risk of flooding and that they have therefore taken preventive and protective actions to limit the impact of flooding on their property and lives. This is investigated below by analysing whether prior flood experience and actions taken by respondents to limit impact of flooding on their families was related. The responses to action taken to limit impact of flooding on their families grouped by prior flood experience are shown in Figure 5.19.

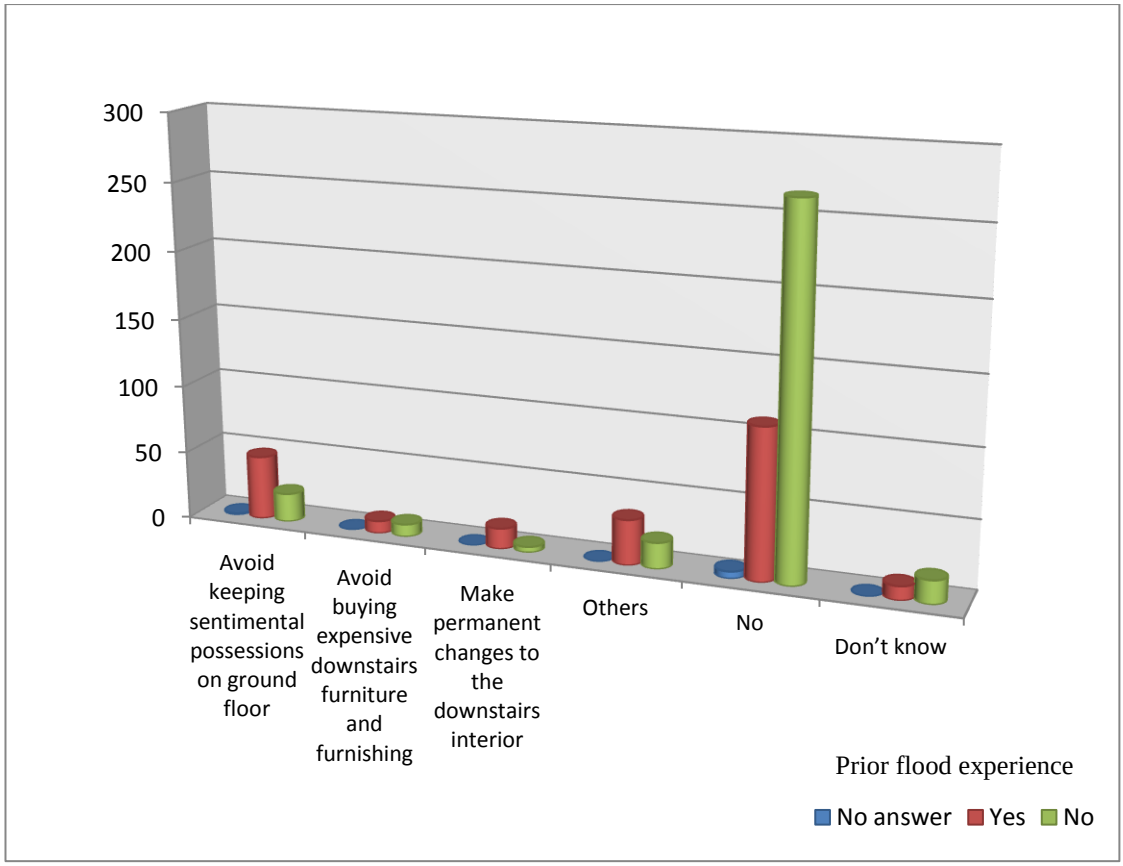

Figure 5.19: Action to limit impact of flooding on family grouped by prior flood experience

It can be observed that the number of respondents with prior flood experience who took some action to limit the impact of flooding on their families was higher than respondents without prior flood experience. However, the proportion of respondents with prior flood experience who did not take any action to limit impact of flooding on their families was still substantially high. This suggests that a flood risk communication strategy should include individuals whether or not they have prior flood experience. As before, it is understood that flood risk communication may not be the only defining factor related to this issue.

This section further examines whether those with prior flood experience were more likely to prepare a flood action plan. Table 5.5 shows that as expected, respondents who experienced flooding in the past did tend to have a flood action plan although the number of respondents not having a flood action plan despite prior flood experience was still higher than those who had a flood action plan. The overall percentage of the respondents who answered positively was surprisingly low at 22.8%. The low

percentage of respondents who had a flood action plan despite previous experience of flooding is worth noting in developing a flood risk communication strategy.

Table 5.5: Respondents having flood action plan grouped by prior flood experience

Flooding experience in the last 10 years	**Do you have a plan for action in the event of flooding?**				**Total**
	No answer	Yes	No	Not sure	
No answer	1	3	3	0	7
Yes	3	79	109	26	217
No	7	44	255	33	339
Total	**11**	**126**	**367**	**59**	**563**

This section further assesses whether those with prior flood experience were more likely to actively seek information to raise their awareness about flooding. However, as observed from Figure 5.20, the number of respondents with prior flood experience actively seeking information to raise awareness about flooding appeared to be lower than the number of respondents who had no prior flood experience. Qualitative research presented in the next chapter investigated why motivation to seek further flood risk information was not prevalent amongst individuals who had previous flooding experience.

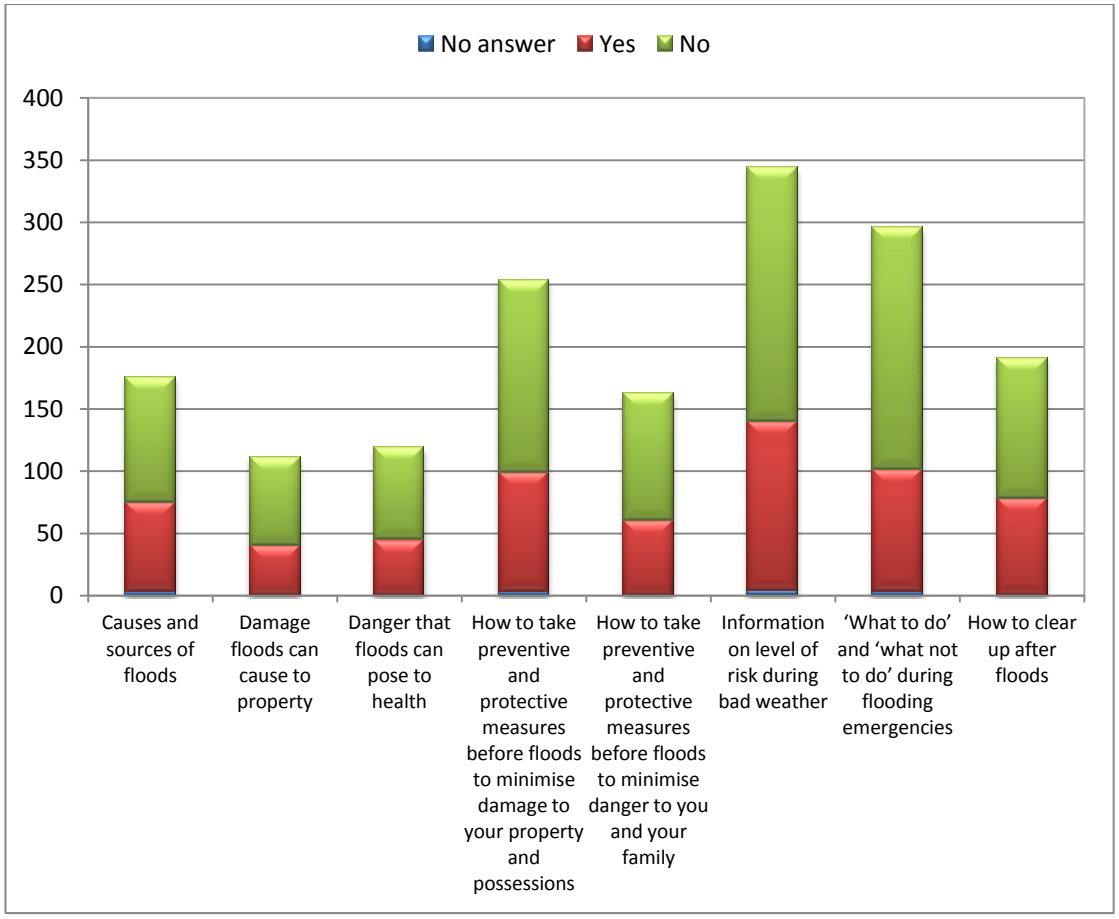

Figure 5.20: Prior flood experience and further information sought to raise flood awareness

5.8 Further detailed analysis

The following sections present further detailed analysis in view of the theoretical considerations of the research and the factors identified through the literature review which may affect flood risk communication.

5.8.1 Perceived risk level Vs Action taken and Plan for action

This analysis was carried out to investigate whether perceived risk level had influenced decisions on action to be taken to limit the impact of floods on their families and whether it prompted a plan for action. The analysis is presented in Table 5.6.

Table 5.6: Relationship of perceived risk level, preventive actions taken and flood action plan

Do you have a plan for action in the event of flooding?			Action to limit impact of flood						Total
			Avoid keeping sentimental possessions on ground floor	Avoid buying expensive downstairs furniture and furnishing	Others	**No**	Make permanent changes to the downstairs interior	Don't know	
No answer	Perceived flood risk level	Medium	1	0	1	1	0	0	2
		Low	0	1	0	2	0	0	3
		Don't know	0	0	0	2	0	0	2
		Total	1	1	1	**5**	0	0	7
Yes	Perceived flood risk level	No answer	0	0	1	0	0	0	1
		High	17	4	15	29	8	1	64
		Medium	13	2	12	20	3	2	43
		Low	3	0	0	1	0	0	4
		Don't know	1	0	1	3	0	1	5
		Total	34	6	29	53	11	4	117
No	Perceived flood risk level	No answer	0	0	0	3	0	0	3
		High	7	2	7	86	4	3	106
		Medium	16	2	5	109	1	6	139
		Low	1	0	0	50	0	2	53
		Don't know	1	2	2	46	1	3	53
		Total	25	6	14	**294**	6	14	354
Not sure	Perceived flood risk level	No answer	0	0	0	1	0	0	1
		High	3	4	2	12	0	3	22
		Medium	5	0	4	8	1	2	18
		Low	1	0	1	4	1	0	5
		Don't know	0	1	1	3	0	4	9
		Total	9	5	8	28	2	9	55

It can be observed that respondents who perceived that the risk to their area was medium or high avoided keeping sentimental possessions on the ground floor. However, it can be observed that even a substantial proportion of those perceiving that the flood risk level in their areas was high or medium did not take any action to limit the impact of floods on their families. Qualitative research explored why individuals who are aware of an obvious danger of loss or damage to possessions did not take preventive or protective actions and is presented in the next chapter.

5.8.2 *Satisfaction about availability of information Vs further information sought*

A further analysis was carried out comparing 'level of satisfaction of the residents with how readily available flood related information was' with 'what further information they sought to help raise their awareness about flooding'. The analysis is presented in Figure 5.21.

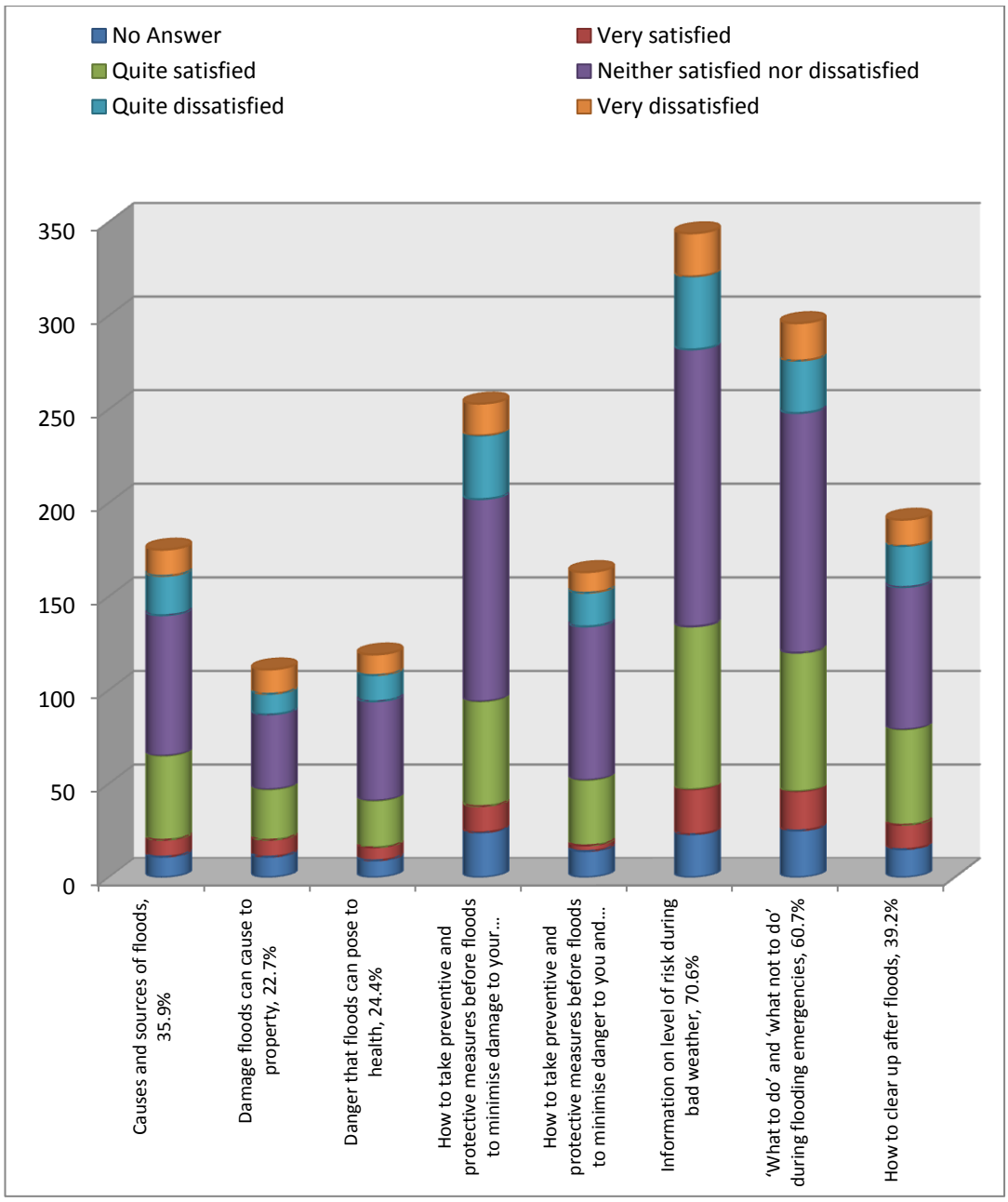

Figure 5.21: Level of satisfaction about how readily available is flood related information and what further information the respondents sought

From Figure 5.21 reveals that although the majority of the respondents rated their level of satisfaction as 'neither satisfied nor dissatisfied' or 'quite satisfied', it can be

observed that information on level of risk during bad weather, appropriate actions during flooding emergencies, how to take preventive and protective measures to minimise damage to property and possessions as well as danger to family were the topics on which a substantial proportion of the respondents indicated that they needed more information.

It can also be observed that 35.9% respondents expected more information about causes and sources of flooding in their area. This can be compared with the responses as seen in Figure 5.3 where 94.4% respondents identified what they perceived to be the source of flooding in their area. This means that even if the majority of the respondents had identified the source of flooding in their area, there seems to be a lack of confidence or uncertainty in that more than a third of the respondents still sought more information.

5.8.3 Daily use media Vs preferred media for flood risk communication

This section assesses whether the media used by individuals on a daily basis were also the preferred media for flood awareness purposes. Distribution of the media used by the respondents on a day-to-day basis against their preferred media for flood awareness purposes is shown in Figure 5.22.

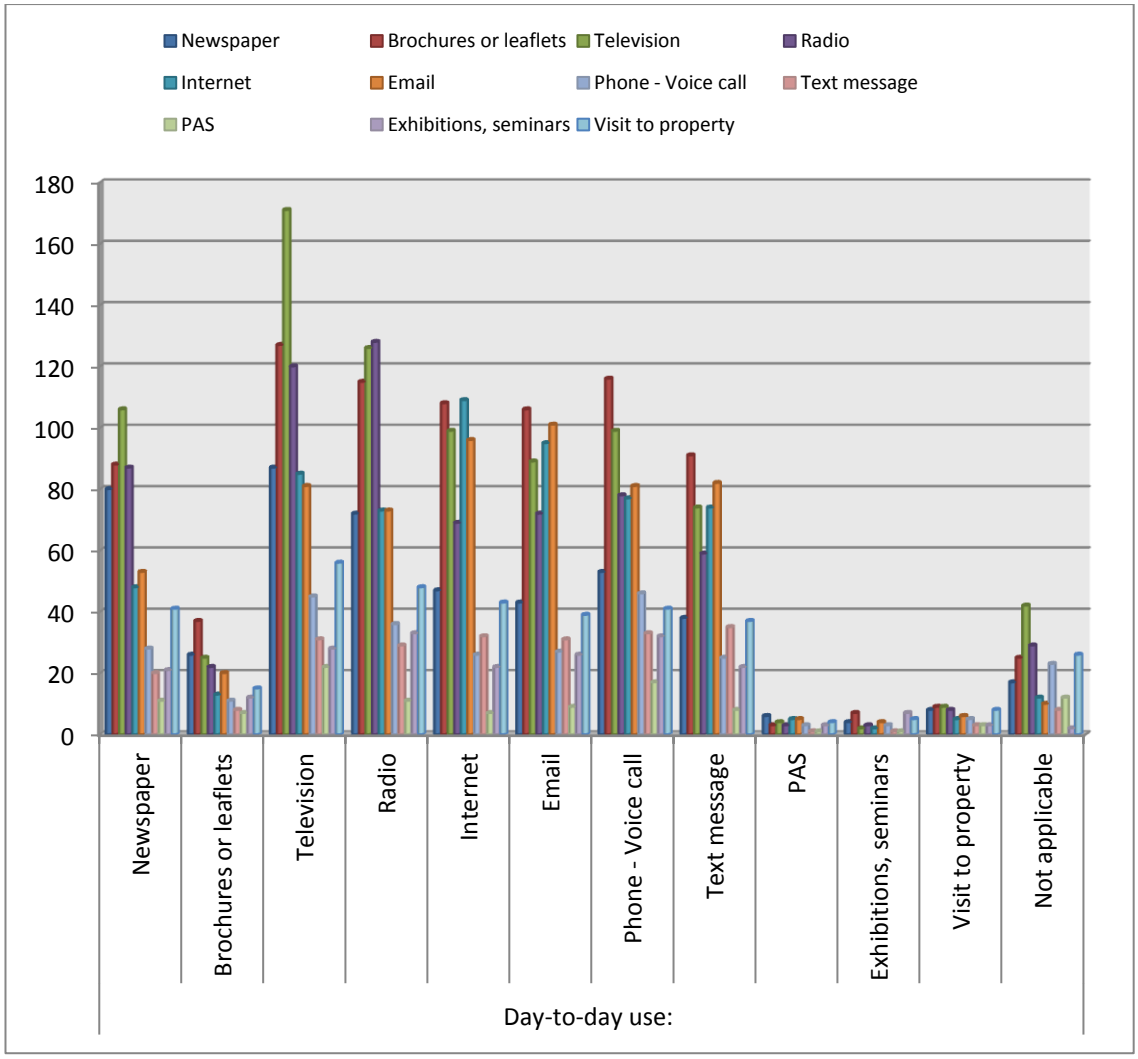

Figure 5.22: Comparison of media used by the respondents on day-to-day basis and the preferred media for awareness

As can be seen from Figure 5.22, the media preferred by respondents for flood risk awareness were not the same as the media they used on a day-to-day basis, for example, respondents who used newspapers on day-to-day basis preferred flood awareness information through television, brochures & leaflets and radio rather than through newspapers. It can also be observed that in all the above categories, brochures & leaflets were seen to be one of the preferred media for flood awareness information.

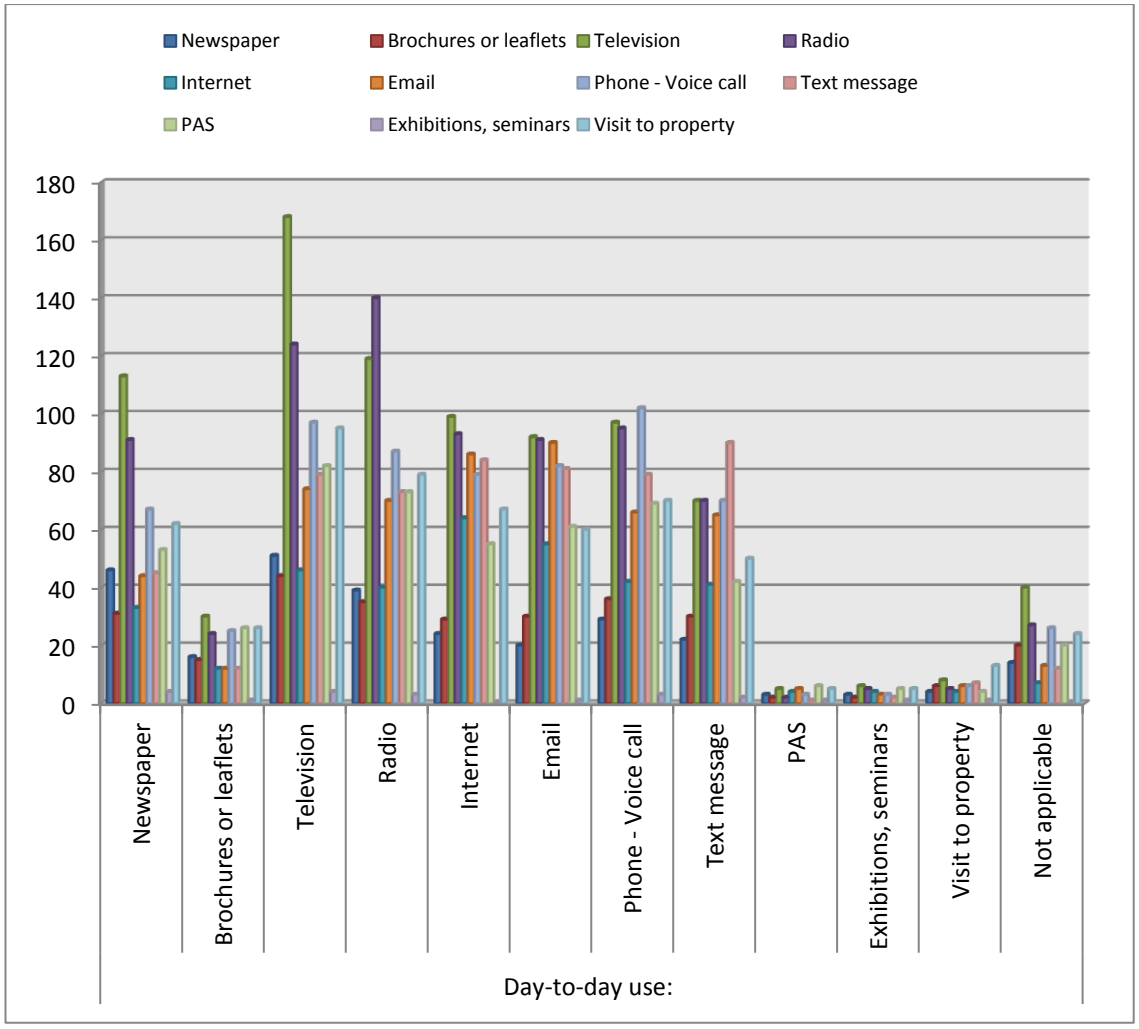

Figure 5.23: Comparison of media used by the respondents on day-to-day basis and the preferred media for warning

A similar trend of preference for different media than the media used on a day-to day basis for flood warning purposes can be observed in Figure 5.23. Further, it can also be observed that a noticeable number of people preferred phone voice call, visit to property as well as notification by text messages. Therefore, it can be concluded that a media strategy for flood risk communication would be more successful if it employed a range of media and was confined to only the media which people use on a day-to-day basis.

5.8.4 Privacy concerns media Vs preferred media for warning

This section assesses whether a media about which some respondents had privacy concerns was among the preferred media for flood warning purposes. From Table 5.2, it is observed that some of the respondents had privacy concerns when visit to property, text message, phone voice call, public announcement system or email were used for

flood risk communication which includes awareness and warning communication. Distribution of these media with privacy concerns and the media preferred for flood warning purposes is shown in Figure 5.24.

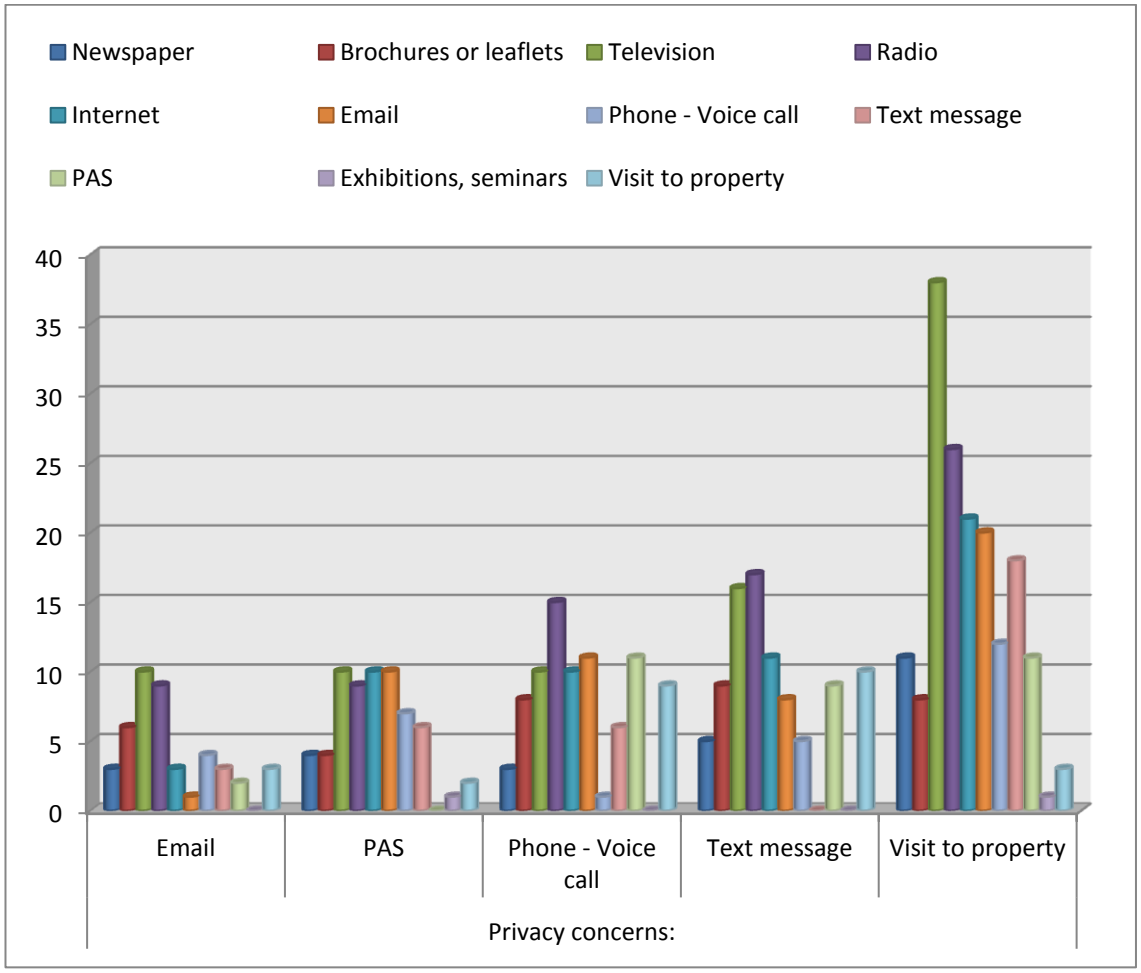

Figure 5.24: Preferred media for flood warning by respondents having privacy concerns

From Figure 5.24 it can be observed that, respondents who had privacy concerns about a particular media did tend not to prefer that media for flood warning purposes. However, at the same time it can be observed that other media, about which some other respondents had privacy concerns, were preferred by those respondents. Therefore, it can be strongly inferred that that even if some sections of the communities did have privacy concerns about certain media, other sections of the communities were prepared for some of these to be used for flood warning purposes.

5.8.5 *Technical or personal difficulty concerns media Vs preferred media for flood risk communication*

This section assesses whether a media about which a respondent had technical or personal difficulty concerns was among the preferred media for flood awareness and warning purposes. These are tabulated in Table 5.2.

From Table 5.2, it was observed that some of the respondents had technical or personal difficulty concerns if internet, email, text message, exhibitions & seminars, public announcement system or phone calls were used for flood awareness purposes. Distribution of these media with technical or personal difficulty concerns and the media preferred for flood awareness purposes by those respondents is shown in Figure 5.25.

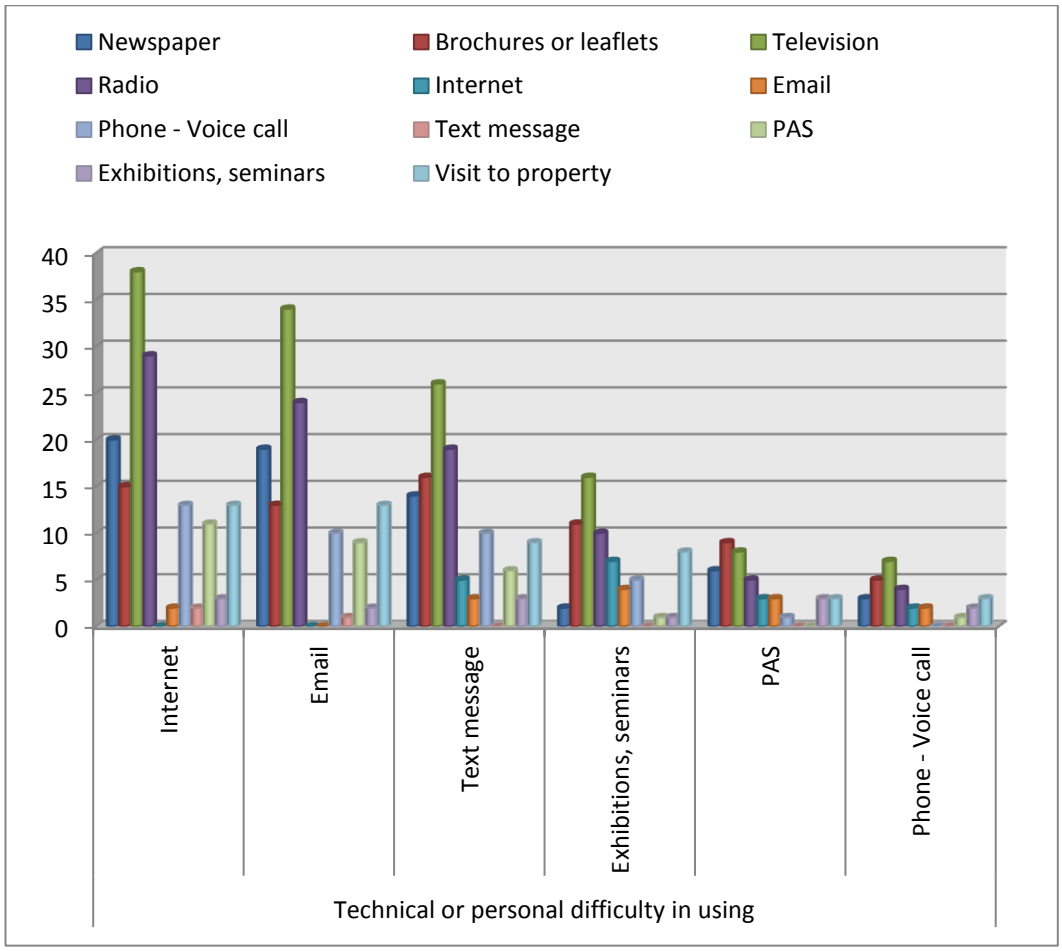

Figure 5.25: Preferred media for flood awareness by respondents having technical or personal difficulty

From Figure 5.25 it can be observed that, respondents who had technical or personal difficulty concerns about a particular media did tend not to prefer that media for flood

awareness purposes. However, at the same time it can be observed that other media, about which some other respondents had technical or personal difficulty concerns were preferred by those respondents. Therefore, it can be concluded that a wide range of media should be employed for flood awareness purposes.

Distribution of media with technical or personal difficulty concerns as discussed earlier and the media preferred for flood warning purposes by these respondents is shown in Figure 5.26.

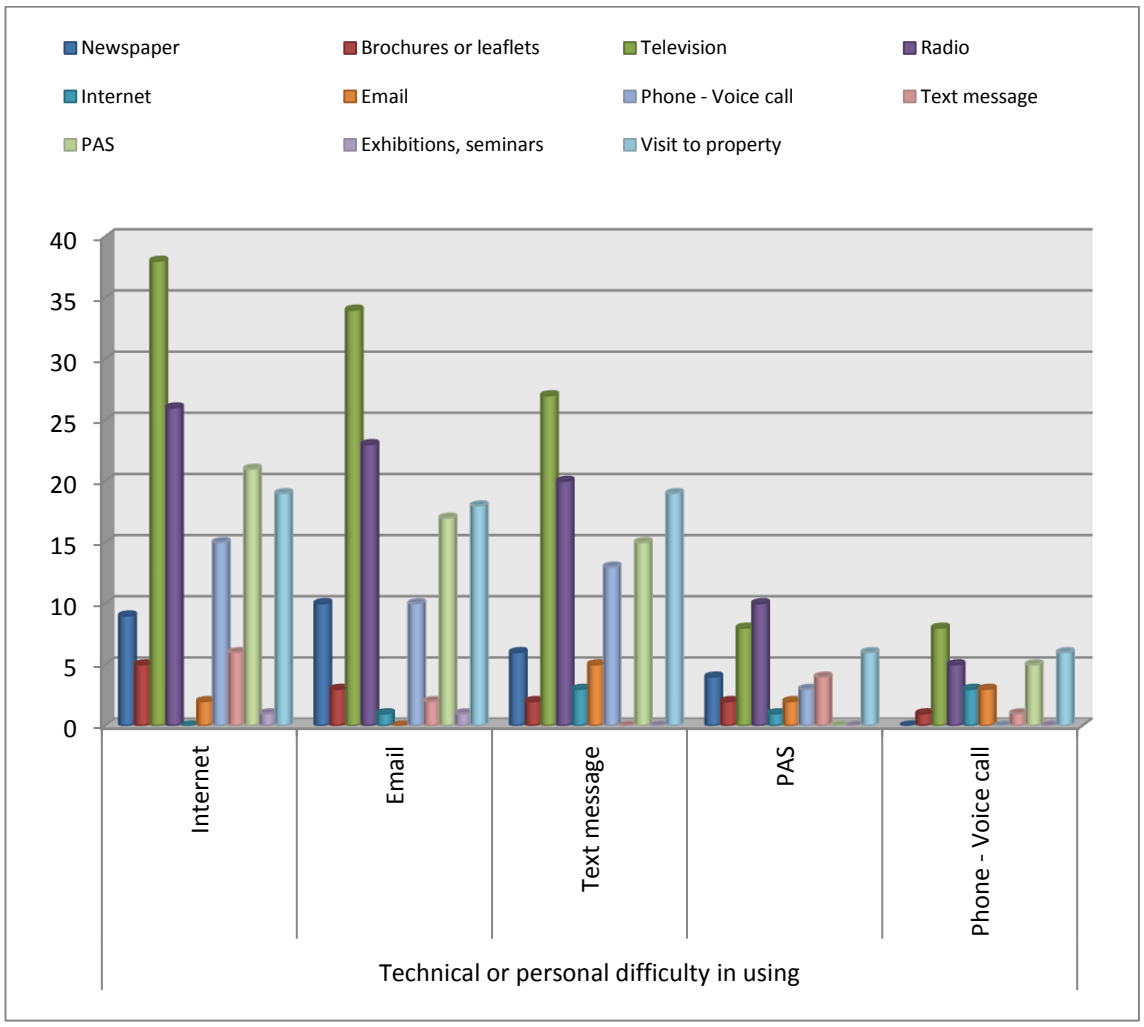

Figure 5.26: Preferred media for flood warning by respondents having technical or personal difficulty

As earlier, from Figure 5.26 it can be observed that, respondents who had technical or personal difficulty concerns about a particular media appear not to prefer that media for flood warning purposes. However, at the same time it can be observed that other media,

about which few other respondents had technical or personal difficulty concerns were preferred by those respondents. This serves to reinforce the previous finding that a wide range of media should be used for flood warning purposes to take into account the needs and preferences of those who have technical or personal difficulties with certain media.

5.9 Summary

This chapter presented the analysis of the postal survey responses received. The response rate for the survey was 20.85% and the responses represented all the age groups well. The percentage of female respondents was slightly more (57.9%) than the male respondents. The length of stay of the respondents varied widely but a substantial percentage of the respondents were living in their houses in the flood zone areas for more than 2 years (81.5%), most of them (76.6%) owned their houses and a substantial number of respondents (38.5%) had prior flood experience.

Section 5.3 presented a series of inferences about the level of knowledge the respondents had about flood risk in their areas. It is noteworthy that the areas where the questionnaires were posted were identified to be at risk of flooding. About three-quarters of the respondents (74.1%) indicated that they considered the risk of flooding to their properties to be medium to high. The respondents indicated that the causes and sources of flooding were primarily high water levels and overloading of drains as a result of heavy rainfall. About half of the respondents indicated that their house could be damaged (54.8%) and that flooding could also result in damage to furnishings and electrical appliances (49.7%). However, surprisingly about three-quarters of the respondents indicated that they had taken no action to limit the impact of flooding on their families (71.3%) and a similar proportion did not have any plan for action in case of flooding (72.8%).

Section 5.4 presented the analysis of the sources of information identified by the respondents, the level of satisfaction about the information they had received and the topics on which they thought they needed more information to raise their awareness about flooding. Weather forecasts on TV, radio and in newspapers as well as neighbours and friends were indicated as their main sources of information by the majority of the respondents. Further, less than half of the respondents indicated that they were satisfied that the information was easy to understand (39.1%) and that the

information was easily available (38%). More than half to three-quarters of the respondents indicated that they sought further information on how to take preventive and protective measures before floods to minimise damage to their properties (52%), the action they should or should not take during flooding (60.8%) and the level of risk during bad weather (70.6%).

It is noteworthy that SEPA does not issue flood warnings to individuals but one can receive flood warning information by visiting the SEPA website or by contacting SEPA by phone. An analysis of the sources of flood warnings found that just over a quarter of the respondents (28.6%) indicated that they had received flood warning and that most of the flood warnings (44.2% of the 28.6%) they came across were from 'Other' sources. A further analysis of the responses revealed that more than half (61.8%) of the flood warnings were issued by the police. It was further found that about three-quarters (69.6%) of the respondents who had indicated that they had received a flood warning, did not take any post-warning action.

The last section of the questionnaire, analysed and presented in section 5.5 and 5.6, was aimed at identifying the media usage pattern of the respondents and their preferences for receiving flood risk awareness information as well as flood warnings. Although responses to the media usage pattern related questions were lower than responses to other questions, one of the questions, which enquired about the media the respondents used on a day-to-day basis, received a good response (83.1% responses). The respondents indicated that TV, radio, internet, e-mail, phones and newspapers, in that order, were the media they used the most. Some of the respondents also indicated that they had concerns about privacy related to visit to property, phone calls and text messages on their cell / mobile phones; and personal or technical difficulties concerns related to internet, email, text message, exhibitions & seminars, public announcement system and phone calls. The analysis of which were their preferred media for flood risk awareness found that TV, brochures or leaflets and radio were their preferred media. Likewise the analysis of the preferred media for communication of flood warnings found that TV, radio, phone calls and visit to property were their preferred media.

A detailed exploratory analysis of the survey responses examining the effect of demographic factors and interrelationships of other variables was also carried out. The

analysis is presented in Sections 5.7 and 5.8. The displayed data suggested that perceived perception of flood risk, length of occupancy of current residence, home ownership and prior flood experience were not closely related to individuals who took preventive or protective actions to limit the impact of floods on their families. The analysis further found that the sources of information the respondents indicated that they used on a day-to-day basis, for example newspapers, were different from the media they preferred for flood risk awareness, for example brochures and warning, for example radio. Further, some of the media stated above which the respondents indicated that they had privacy concerns about, for example visit to property, and personal or technical difficulty in using them, for example, mobile phones, were also the media some of the respondents indicated as their preferred media for flood risk awareness and warning, indicating that a broad range of media should be employed in developing flood risk communication strategies.

The analysis also demonstrated the limitations of quantitative research methodology in investigating reasons behind specific findings although it was successful in bringing some surprising findings to the fore. These findings were explored through qualitative research by carrying out one-to-one interviews and focus group discussions. The qualitative analysis of these data is presented in the next chapter.

Chapter 6
Interviews and Focus Groups Data of the Communities

6.1 Introduction

As mentioned earlier in the chapter on research design and methodology (see section 4.2), the research is essentially qualitative in approach. One-to-one interviews and focus group discussions were used to collect data for the study. Details of the design of interview guide, focus group discussion guide, recruitment of participants and how the interviews and focus group discussions were conducted are provided in section 4.6 and 4.7. Section 4.8.3 provides details on the tools and techniques adopted for analysing these data. This chapter presents the analysis of these data.

Section 6.2 details the demography of the participants and is presented in sections 6.3 to 6.6. Section 6.3 contains qualitative analysis of the level of knowledge the participants had about flood risk in their area, section 6.4 considers the qualitative implications of their sources of information and their views about those sources as well as their views on the information they had received through those sources and their expectations. Section 6.5 details the media usage pattern of the participants together with their concerns about specific media. Section 6.6 presents the views of the participants about their preferred media for flood risk communication including for awareness raising and flood warning. Finally, section 6.7 summarises the chapter.

6.2 Demographics of the participants

As stated earlier in section 4.6.2 seven one-to-one interviews were carried out. However, as stated in section 4.7.2, only one participant took part in the first focus group discussion, therefore the proceedings of this focus group were treated as one-to-one interview. As such the number of one-to-one interviews considered for the qualitative analysis presented in this chapter is eight.

Out of the eight interviewees, five interviewees were from Edinburgh and three were from Stirling. One female and six male interviewees were postgraduate students and one male interviewee was running his own business. Five of the seven students were

aged from 20 to 23 years and two students were aged 37 and 42 years. The businessman was of 50 years age. Further, four interviewees owned their houses and the remaining four were living in rented flats / houses. Three interviewees had experience of flooding in the past 10 years. At the time of the interview, the interviewees were living in their houses for periods ranging from 3 months to 19 years.

A total of 69 participants took part in the focus group discussions out of which 31 were males and the remaining 38 were females. The ages of the participants ranged from a minimum of 16 to a maximum of 81, the average age of the participants being 57. The age distribution of the participants is shown in Figure 6.1.

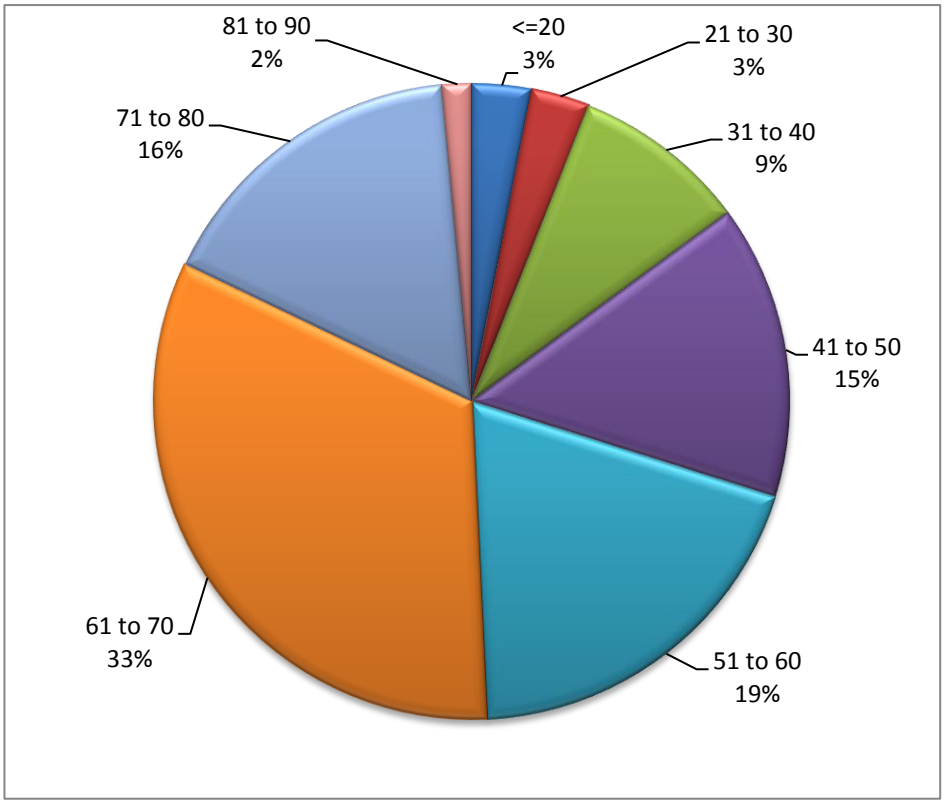

Figure 6.1: Age distribution of the focus group participants

During the focus group discussions, it was observed that the younger participants were not expressing their thoughts as much as the elders; although attempts were made to elicit information from the younger participants. Further, it can be observed that the percentage of participants below 30 years was only 6%. Therefore, it can be stated that the views of the people aged up to 30 years were more fully expressed in the one-to-one interviewees. As shown in Table 6.1, 59 out of the 69 (85.5%) participants owned their

properties and were living at their current addresses for an average of 15 years time. Of all the participants, almost 60% had earlier flood experience. With such a high level of home ownership, length of occupancy and experience of flooding, a proportionate percentage of the participants might have been expected to have taken action to prevent damage from flooding to their properties. However, as we shall see below, this was not the case.

In the basic information sheet handed over to the interviewees and focus group participants prior to the interviews and discussions, they were asked to state if they had taken any action to prevent damage from flooding to their properties. It was advised that the above may include: having a flood kit at home, having flood insurance, arrangements for receiving flood warnings in time, structural changes to properties to prevent damage from flood waters, etc. Except for one interviewee, none of the interviewees had taken any action to prevent damage from flooding to their properties. On average, more than half of the focus group participants (52.2%) stated that they had not taken any action to prevent damage from flooding to their properties. The percentage of participants stating that they had not taken any action to prevent damage from flooding to their properties was the least among participants in Callander and was the highest among participants in Bonnington, Edinburgh.

Table 6.1: Profile of the focus group participants

Place	Number of participants	Owned property	Average time at current address (years)	Had earlier flood experience	Not taken any action	% stating 'Not taken any action'
Murrayfield, Edinburgh	18	15	22.8	10	10	55.6%
Stockbridge, Edinburgh	15	13	13.1	6	9	60.0%
Bonnington, Edinburgh	14	10	10.7	10	12	85.7%
Callander	8	8	13.9	5	1	12.5%
Stirling	14	13	14.6	10	4	28.6%
Total	**69**	**59 (85.5%)**		**41 (59.4%)**	**36 (52.2%)**	
Average			**15.0**			

From the information presented in Table 6.1 above, it can be seen that more than half (52.2%) of the participants stated they had not taken any relevant action. This finding is similar to the finding of the quantitative analysis (see sections 5.7.2 to 5.7.4). The causes for this could not be explored by quantitative research methodology. Below, insights to this and gained through qualitative research is presented.

6.3 Knowledge about flooding

The significance of prior knowledge, as understanding and awareness, in developing risk perception and thus risk management was stressed in sections 1.5 and 3.2. Similar to section 5.3 which presented analysis on this aspect using quantitative data, this section presents qualitative analysis of the data aimed at understanding the level of awareness of the participants about flood risk in their areas. This is achieved by analysing the responses of the participants related to the causes and sources of flooding in their areas, perceived level of flood risk, damage floods can cause, measures to limit the impact of floods and their understanding and expectations related to responsibility for protection from floods. This analysis is presented below in sections 6.3.1 to 6.3.6.

6.3.1 Causes and sources of flooding

As explained earlier, SEPA which represents the etic perspective in this research, had produced flood risk maps. These maps represent estimates of risk of flooding from watercourses and coastal flood risk. These maps were adopted in the research to identify the study areas. As anticipated, these estimates of the areas at risk of flooding differed considerably from the perceptions of the residents living in some of these areas, who provided an emic perspective.

The most common source of flooding the interviewees cited was a nearby watercourse, whether a small river or a big river, being surcharged by heavy rainfall. Other cited sources of flooding included surcharged drainage systems, urban surface runoff and coastal flooding. The causes of flooding reported by the interviewees included heavy rainfall, blockage of watercourses elaborated below, and blockages due to construction material entering into drains.

It is also noteworthy that on this topic, participants of all the six focus groups reported that the most likely cause of flooding in their areas was mismanagement of floodwaters

in upper catchments when it was released from the reservoirs. This was cited to be the main cause of floods in their areas by participants in all the areas, for example,

> *"They could not control what was happening to the reservoirs. It is a fact that the reservoir was overfilled that's why we got flooded in the year 2000, not because it was excessive rain at that particular time... At that time Scottish Water would control [the reservoirs]… they were told that they were not supposed to drop the level because of nesting ducks and nesting birds"* [Male, Murrayfield, Edinburgh]

Further, two female participants during one of the two focus group discussions in Murrayfield reported that some houses near the rugby ground in Murrayfield were flooded when the firemen removed floodwater from the rugby ground in preparation for a match and let it into the Water of Leith. Similarly, related to the mismanagement or failure to manage floodwaters was an incident cited by a male participant in Stirling. He mentioned that the sewage pumps failed because of short circuit in the pump control box due to it being situated on the ground level and subsequently being flooded. Other participants from Stirling focus group cited more examples of similar occurrences in Stirling. From the above examples of mismanagement of floodwaters as reported by the focus group participants, it can be seen that at the local level, there seemed to be issues about how the floodwaters were managed. Alternatively, it could be the case that the communities in all three study sites were not informed adequately in order to enable take actions.

The second most commonly cited cause of flooding in these areas as stated by the participants was lack of maintenance of the river channels which was perceived to be leading to insufficient conveyance or reduced water carrying capacity or even blockages. Natural causes such as overhanging trees and growth of vegetation on the banks of the rivers and fallen trees were most frequently cited. However, the cited causes were not limited to natural causes only. The participants also recalled seeing shopping trolleys, bikes, other rubbish and even a car pushed into the river.

The third most commonly cited cause of flooding was lack of adequate surface drainage systems and blockages of drains due to lack of adequate maintenance. For example, a male participant in Callander recalled flooding from a culvert which was blocked due to

debris. A female participant in Murrayfield mentioned that she had noticed that there were fewer drains recently than a few years ago. Several participants in Stockbridge mentioned that the drainage system in their area was inadequate, the local council's engineers did not know the drainage system properly, the maintenance was superficial and it took a long time for them to pursue local councils to clear some of the drains.

The next most commonly cited cause of flooding in their areas by the participants from all the areas was changes in the upper catchments. The type of changes were reported to be construction of houses, flood defences, deforestation or even inter-catchment water transfer such as water supply to houses from other catchments. Further, other reasons like discontinuing dredging of river channel was also thought to increase flood risk, for example,

> *"I believe they used to dredge the river further downstream in the past and I believe they have ceased dredging the river. So, well, if that has an effect on the flooding, I don't know. But I suspect that may well have; because, I know, it's a problem in Glasgow since they ceased dredging the Clyde and that has made the flooding... flood threat in Glasgow seeming to go higher. So I don't see why it shouldn't be the same on the Forth since they have ceased dredging. I think that may contribute to the flooding as well"* [Male, Stirling]

In summary, the causes and sources of flooding according to the focus group participants were extensive including surcharged rivers and drains due to excessive rainfall, snow melt and high tide combined with heavy rainfall. In addition, groundwater was reported to be one of the sources of flooding of properties. However, the causes of flooding as discussed above were quite different from the ones reported by the interviewees. This could be attributed to their experiences and knowledge of the historical floods in their areas, thus the reflexive nature of their knowledge on this topic, which was evident throughout the discussions.

Comparing the findings of this analysis to the quantitative analysis presented in section 5.3.2 which used a pre-given list of causes and sources, it can be observed that the qualitative analysis demonstrates that the knowledge on this aspect possessed by the communities was far more extensive. It also included more number of causes and sources of flood risk in their areas than that assessed by SEPA. Additionally, the

findings demonstrated evidence of social rationality, for example, the communities believed that one of the causes of flooding was mismanagement of floodwaters instead of heavy rains. This demonstrates that the etic and emic perspectives on this topic did not converge. This topic, therefore, is a candidate for further consideration through improved flood risk communication.

6.3.2 Level of flood risk to the area

Again, as for the 'causes and sources of floods' there could be differences in the level of flood risk as assessed by the agencies (the etic perspective) and the level of flood risk perceived by the people themselves (the emic perspective). It was highlighted in section 5.3.1 that SEPA does not provide a level of flood risk apart from providing a 1 in 200 year flood risk outline, with a caveat that it is indicative only. Against this background information, the following analysis presents the views of the communities on their perceived level of risk of flooding in their areas.

The interviewees from Edinburgh perceived the level of flood risk in their areas as 'pretty low', 'low', 'low to medium' whereas the interviewees from Stirling perceived it to be 'low to medium' and 'high'. They also explained why they thought so which was mainly related to where they were living in relation to the nearby watercourses.

The participants of Callander and Stirling focus groups perceived that the level of flood risk was high in their areas. Further, in Callander the risk level was said to be varying depending on the location. The participants of Murrayfield focus group perceived the level of flood risk in their area to be high but one female participant mentioned that it could be low and depended on the time of the year. Participants from Bonnington and Stockbridge area thought that the flood risk to their area was medium to low but it could increase depending on other factors, for example,

> *"In essence it's, it's a low risk... in terms of natural… a natural risk. It could be increased depending on what man made things happen to it, which would be the council, the reservoirs, building planning constraint, etc*." [Male, Stockbridge, Edinburgh]

Participants from all the areas thought that the level of flood risk was increasing as a result of 'global warming' or 'climate change' and also anticipated increases in risk level due to changes in land use and constructions in floodplains. Some participants,

particularly from Stirling and Stockbridge areas, mentioned that they had noticed that the frequency and severity of flooding had increased in recent times. This shows that the risk perception is reflexive (adjusted based on knowledge and experience) and that there could also be local variations in terms of community perceptions relating to risk of flooding over time.

The risk level descriptors stated above - 'pretty low', 'low', 'low to medium' and 'high' - are subjective and non-standard, meaning that they are subject to variations depending on how one defined and perceived them, and hence its reflexive nature. However, the above responses nevertheless demonstrated that most participants were aware of some risk of flooding in their areas, but perceptions of the level of risk identified differed across and within areas. Comparing these findings with the etic perspective of level of flood risk identifies the weakness of flood risk assessment carried out by SEPA which is only a high level assessment and includes only a few sources of floods, and highlights the importance of more detailed flood risk assessment and inclusion of information on these in a flood risk communication strategy. This also shows the role knowledge plays in forming risk perceptions of the communities.

Thus, the etic and emic perspectives differed on this topic, primarily due to the limitations of the etic perspective which was informed by only a high level assessment of flood risk. The high level risk assessment did not consider other sources and causes of flood risk and also did not provide property specific information to enable individual members of the communities to determine level of risk to them. Thus, it can be seen that there is a room for learning for both: the communities as well as the agencies. It can be recommended that they should work towards developing shared understanding on the level of risk in the individual areas identified to be at risk of flooding by the agencies. This can be undertaken through, as Habermas contends by his Theory of Communicative Action, a dialogue with the communities.

6.3.3 Effects of floods on property and possessions

The interviewees and focus group participants were asked to elaborate on what they thought were the likely effects of floods on their property, possessions and lives in the event of flooding in their area, or to recall and describe the effects of floods they had experienced in the past. The effects of floods they described can be broadly categorised

as tangible and intangible effects. The tangible effects relate to the building structures and contents and the intangible effects to the possessions of sentimental value and health. They all agreed that floods could have serious consequences not just during the floods but after the floods too, for example,

> *"Well, you are looking at plasterboard up to about 1.5 meters… soaked… capillary action probably taking that up further… if it is a particularly deep flood over a long period of time, you can have structural damage to the property... damage to the property contents"* [Male, 42, Riverside, Stirling]

and

> *"As far as I know, when a building gets flooded, it's not just the water that's the problem, it's the after-effect… like even when the water is gone, it causes rotten stuff and causes weakened structure and also brings lots of dirt and stuff. "* [Male, 20, Haymarket, Edinburgh]

The damage to property and possessions described were quite detailed. Of all the effects related to property and possessions, damage to building or property were the most commonly cited and one participant reported that the financial costs were also high, for example,

> *"Because the flooding has been so bad that they even had to have their walls redone, their wiring redone, everything redone... even the gardens, I mean the gardens were ruined, yeah. And may be that doesn't sound much for somebody, but if you put a lot of work into your garden [that matters a lot to you*]" [Female, Murrayfield, Edinburgh]

or

> *"When we were flooded in [the year] 2000, it cost us 40,000 pounds… so really serious damage"* [Male, Stockbridge, Edinburgh]

to which another participant added:

> *"You can multiply that by the number of properties"* [Male, Stockbridge, Edinburgh]

From the above it can be realised that flood damage, in addition to obvious financial costs, also have emotional costs associated with them. One participant also mentioned another related concern stating that at times they had to resort to cheap replacements for house repairs because of the non-availability of genuine replacements.

They also thought that possessions of sentimental values like photos, presents, gifts, or something they cherish could be at risk, for example,

> *"I have boxes of memories, cardboard boxes full of other stuff from my childhood… like old photographs and stuff like toys we had when we were growing up as kids… old mementos… and these memories can be passed… that would be a major one just because… well if the water comes in contact with the cardboard box… it's just gonna be inside it… it just can't stand it…"* [Male, 20, Haymarket, Edinburgh]

Some focus group participants described past experiences of flooding and brought photos of damage due to floods to show to other participants and the researcher. However, some participants from Stirling mentioned that they were able to save valuables and non-replaceable items. This was because they were either alerted in enough time or because they were watching the river. This reinforces the arguments put forward through literature that timely warnings are very helpful in avoiding loss of possessions as well as avoiding post-flooding inconvenience, stress and financial costs.

Participants also thought that personal and household electronic and electrical equipment, like computers and TVs, would be at risk of damage, and might need rewiring or repairing. In addition, carpets, flooring, curtains, sofas and anything that couldn't be raised up to a higher level such as kitchen appliances were also identified to be at risk of damage. Gardens, including plants, décor and children's playing equipment in the garden (for instance slides, swings, sandboxes), as well as cars parked in the flood prone areas were identified to be at risk of damage if flooded. In addition to personal possessions, they were also concerned about public gardens and roads and the cost to the taxpayers.

Participants, particularly from Stockbridge, Bonnington and Stirling focus groups, also noted the lowering effect on the property value if a property was located in an area

which was perceived or identified to be flood-prone. They cited examples from their areas as well as England where such an effect had been observed. Another issue related to the effects of floods on property and possessions that was mentioned in every focus group discussion was the difficulty people were facing in obtaining building and contents insurance which covered damage caused by flooding.

The above analysis again demonstrates the reflexive nature of the knowledge as it was based on the flooding experiences they had. Floods are known to affect health and lives also, which is discussed in the next subsection.

6.3.4 Effects of floods on health and lives

Following on from the analysis on property and possessions, the following analysis is aimed at finding the views of the communities living in areas identified at risk of flooding by concentrating on the effects of floods on health and lives. The effects on health and lives which the participants envisaged ranged from inconvenience to a possible death due to flooding. Psychological problems such as stress, fear, anxiety and panic attacks featured as the most commonly cited effects on health. The reasons for stress, fear, anxiety and panic were due to worry related to health and safety of their families, loss of finances due to not being able to work, financing high costs of property repairs, loss of personal belongings and the shock of being in a flood situation, for example,

> *" Stress, yeah…and if it's [the flood] a very quick…you know, you got two kinds [of situations]… first of all if you are not there.... you just [have] a loss of home… having to find alternative accommodation… worrying about your goods…whereas when it [the flood] comes up fast and you are coming out… they are actually quite dramatic. So, I suppose, if somebody is sensitive, you are looking at post-traumatic stress syndrome... if it is a very, very fast... a nasty flood… and immediately you feel different about your house… you know you can actually afterwards just not like your house anymore… the same sort of violation as a burglary…"* [Male, 42, Riverside, Stirling]

or

> *"Yeah mental health… the knowledge and the pains that people have… their psyche will not be there… they won't be feeling comfortable of moving about*

> *having their leisure, the way, you know, which may be burden to them; and as the result people may continue to stay indoors for a long time and it will affect their physiological health … which in effect is not good because as a human being, once a while, you need to walk around…but staying [in] one place because of flood it will increase the emotional and physiological impact on the living beings*"[Male, 37, Cambuslang, Stirling]

Further, lack of support and a sense of powerlessness were also cited:

> *"Yes, that nothing's being done adds to the stress. It's not only that, knowing that… that there might be a flood in the future… it's the sense of powerlessness… that you can't do anything as an individual household... it's the feeling that adds to the stress" [Male, Stirling]*

However, even if there was no flooding in their areas, the participants reported that their normal day-to-day life got disturbed from time to time as they felt they needed to monitor the river water level during nights too. Thus, it can be observed that the communities living in areas prone to flooding are continuously subjected to mental stress, whether or not there is a flood.

The second most commonly cited effect on health and lives was related to sewage entering with floodwaters. It was mentioned that sewage and floodwaters or seeping groundwater led to dampness, growth of mould and fungus as well as foul-smelling premises. These effects were identified as having the potential to severely affect the health of children and elderly persons.

Another effect on health and lives mentioned equally strongly was the inconvenience and disturbance to daily lives because of the need to relocate. Participants mentioned several cases where people had to be out of their houses for up to 18 months or were cut-off from utilities (such as electricity, phone, gas, water supply). As a result, they had to depend on their neighbours even for a cup of tea and were not able to have hot meals for several days. They noted that after a flood there was the possibility of loss of utilities and surcharging of the drainage system, the effects of which could be serious, for example,

> *"We have to bear in minds that when it floods, it's cold, the water seems to suck the heat out of the house. It becomes damp upstairs… whole atmosphere becomes damp... with no heating, no drainage… you can't use your toilet, you can't drink, you can't cook…your house is finished as a habitable area until that's sorted out*" [Male, 42, Riverside, Stirling]

In addition, one participant also narrated how floods prevented her from entering her house and the loss of utilities:

> *"By the time I went back to my house, I couldn't get into my house, three feet of water all around it...So I stayed with friends for three nights. I couldn't get back into house, and when I did get back, there was no electricity; the telephone had gone [damaged]. If I had been in the house I would have been completely unable to contact anyone."* [Female, Murrayfield, Edinburgh]

Several participants reported having gone through similar experiences.

They further stated that damaged brickwork and damaged parts of buildings may collapse and cause death. Interviewees also reported that one could be traumatised, especially if he or she saw a relative or friend die. They also cited the possibility of being swept away and possible death in severe floods due to drowning, particularly if one was residing in a floodplain of big rivers like The Clyde and The Tay. They were particularly concerned about small children, babies and elderly people being at more risk and thought that elderly people may not be able to cope. They also noted that disabled people or people with mobility problems would have particular difficulty in moving things out of the flood risk area and also during evacuation as the streets may be flooded and one would not be able to use a wheelchair on flooded streets. One participant also mentioned about the care of pets and their behaviour during floods.

Thus, it was observed that all the participants had an in-depth understanding of the effects of floods on property, possessions and lives. They understood what effects floods could have on buildings, possessions, property values, property insurance, physical health, mental health as well as the type of issues which would be involved when children, elderly people, disabled people and pets were at risk of flooding.

Thus, congruent with the findings from the quantitative analysis, the analysis of qualitative data found that the communities have understanding of the effects of floods on property and possessions (see previous subsection) and also on health and lives as discussed in this subsection. Furthermore, their views closely matched with the literature on this topic and with the etic perspective. Thus, the etic and emic perspectives converged in this instance. Since risk perceptions are formed partly on the basis of knowledge (see sections 1.5 and 3.2), these findings also demonstrate that the communities had appropriate perception of risk of flooding as far as this topic is concerned. This also suggests that the communities are unlikely to benefit substantially by more flood risk communication efforts on this topic. Section 1.5 also stated that risk perceptions affect public behaviour to take actions as well as their expectations. These aspects are discussed in the next two subsections.

6.3.5 Measures to limit impact on family

This section presents analysis of what measures the interviewees and the participants of the focus groups stated they would employ to reduce the impact of floods on their property and possessions as well as on lives before flood events. The reported measures can be broadly categorised as related to '4As': Avoidance, Alleviation, Awareness and Assistance which are similar to the Scottish Government's strategies for Sustainable Flood Risk Management (see section 2.2.4).

The participants noted that avoiding building in floodplains was preferred and some participants were unhappy that built developments in floodplains were permitted. The alleviation measures the participants mentioned can be categorised as hard measures (structural changes) and soft measures (preventive actions). For new properties to be built in a floodplain, making the property flood-poof either by building on higher ground or raising floor levels was suggested. However, for the existing properties which were prone to flooding, using sand bags or 'sand bagging' was cited to be the most common and preferred measure to tackle flooding, for example,

> *"Well, personally, I would go and try to stop the water coming in and you need sand bags. That is the only thing that we know of that will stop water coming"* [Female, Stockbridge, Edinburgh]

The participants also reported other ways of flood-proofing a property which included permanent structural changes to properties like building a high wall and steps around the property, elevating entrances, installing demountable and permanent flood barriers on the doors, installing air-vent covers, installing non-return valves, installing electrical sockets higher than any flood marks or expected flood levels, using different types of construction materials than the traditional ones which might help aid the post-flooding clean-up process, modification of drainage systems and installation of flood barriers. Participants also reported that they might dig a trench or cut the river banks at certain points and divert flood waters to fields which might reduce the impact of floods on their properties.

However, many participants mentioned that they could do something 'only up to a certain extent' and there was not much they could do to prevent flooding of their properties at an individual level, for example,

> *"So there is nothing where a large percentage of owners can do because they are all retired people and their age ranges from 70 to 95. They are not physically capable of moving stuff. So there is nothing, as I say, in our situation, there are very few people out of the total of a small community, shall we say, in that development, who are physically capable of moving or helping". [Male, Murrayfield, Edinburgh]*

Thus, diminished physical capability due to aging to act against flooding was one of the prime reasons for not taking any preventive action against flooding. Only few participants reported that they had made permanent changes to their properties. The main reason that was cited for not doing anything to flood-proof the properties was the cost of the products. However, one participant also mentioned that there were several products in the market and it was difficult to assess their suitability and effectiveness. Thus, in addition to age, lack of affordability and lack of information were also identified as barriers to taking any preventive and protective action. However, as explained in the next section, participants also thought that the actions they could take at an individual level would not be sufficient to protect them from flooding effects and that the actions were required at agency rather than individual level.

The cited measures which can be categorised as soft measures for flood alleviation can further be categorised as related to property and possessions and related to health and lives. The soft measures related to property and possessions as reported by the participants were: purchasing insurance policies which covered damage due to flooding, 'avoiding keeping too much stuff downstairs', moving belongings upstairs or to the neighbours - if necessary by asking for help from family and friends, moving cars to higher ground, having a supply of collapsible bags which could be used instead of sand bags and having a supply of material which could be used to seal air-vents in case of flooding. In the event of an evacuation, they reported that they would ensure that electricity and gas supplies were switched off (to avoid the risk of internal fires which are possible if these are left on), doors, windows and ventilation vents were closed, the property was locked and valuables in the property were safe.

The soft measures related to health and lives as reported by the participants in the event of being warned of possible flooding were: 'stop panicking', organise alternate supplies of drinking water and electricity, stock non-perishable food, plan an evacuation route, be prepared for evacuation with drinking water supplies and necessary medication. Further, they reported that if evacuation was required, they would make sure that the family was in a safe place and would help elderly neighbours to move to safer places and move their possessions. They also noted that particular attention needed to be given to young children and disabled people, for example,

> *"Certainly for young and old, they have to take priority. So when ideally you have to evacuate people out of the flood risk area before the flooding occurs, you obviously need to identify properties where elderly people are or disabled people are… people that are immobile… you need to identify properties, you need additional help to evacuate the area within the timescale you have*…"[Male, 23, Colinton Mains, Edinburgh]

Many participants reported that they were aware of the flood risk in their areas and regularly observed river levels in order to get an idea about the severity of possible flooding. Most of the participants stated that it would be their first response on receiving a flood warning. However, it is noteworthy that almost all the participants stated that they had no formal flood action plan to follow in an event of likely flooding. This outcome is similar to the outcome of the quantitative analysis presented in the

previous chapter. The research explored the reasons behind this and these are evident throughout the remainder of this chapter. At this juncture it can be stated that this issue can partly be addressed by incorporating the relevant information in the communications with the communities.

Thus, it was found that most participants had an in-depth understanding of the protective and preventive measures to limit the impacts of floods on their property and possessions as well as families before the floods. However, most of them had no flood action plan and some participants had asked for more information on specific topics and products. Thus, a void in the knowledge on the measures to limit impact of floods was noted in the communities which can be filled through improved communication. However, the needs of the communities may vary from household to household and it is unlikely that the relevant agencies would have information on all the products available in the market. Furthermore, the flood action plans prepared by individuals would be more effective if these are linked to the community wide flood action plans. Ensuring so would require a dialogue with the communities. This analysis suggests that communication with the communities is required even if there is evidence that the communities are generally aware of the issues involved, for example the measures to limit impact of flooding in this instance.

6.3.6 Expected actions by others

As discussed in the above subsection, the communities expressed inability to take sufficient actions which would ensure that their properties and families were protected from floods. The interviewees and participants were asked to comment on whether actions should be taken by others to avoid or reduce damage to property and possessions or danger to lives, and if so, by whom and why. They were further asked to describe the type of actions. Their views on this topic ranged from personal responsibilities to the responsibilities of the local authorities, emergency services and the Government at different times: before, during and after the floods in relation to limiting the impact of flooding on their properties and lives.

It is noteworthy that none of the participants mentioned that they would call any agency when they received a flood warning although they expressed their expectations about help from many agencies. However, one male participant from the Murrayfield focus

group said 'never mind' which from his tone implied that they were not very confident or willing to call any agency, whereas one participant recalled calling the police for help but being told that the police were monitoring the river. In contrast, there were many mentions of community, friends and neighbours supporting each other. In general it was realised that the communities at flood risk had a 'community spirit' and were willing to help and support each other whenever possible.

In terms of responsibility with respect to flood risk, a common view amongst all the participants was that much more needed to be done immediately before, during and after a flooding event. However, there was considerable variation among interviewees and focus group participants as to whose responsibility this was. Some of the interviewees thought that it was their own responsibility but local councils had a role to play, for example,

> *"Personally, I think, it is more up to the person who owns the property to take the right measures but then again the council should be pretty and up to date with flooding as well and give you advice… [I would expect] someone from the council to come to my property and give me advice and explain what kind of risks I am prone to, because they'll have maps, etc. and have experts, that'll look into that".* [Male, 20, Joppa, Edinburgh]

and

> *"I suppose if you live by the river, there is an element of personal responsibility. Having lived with the river and got to know it, I think that to be caught out by a flood, there is a degree of personal responsibility in that… but I think the relevant authority should also take measures"* [Male, 42, Stirling]

The above interviewee further thought that authorities should have responsibility for vulnerable people only and that they should have a plan for action as,

> *"The only people, I do feel, the authorities have a responsibility for [are] the vulnerable people… somebody was very elderly, disabled, incapable…I think that it would be a responsibility of the authority to have a list [of] those people and be able to come to their assistance" …* [Male, 42, Stirling]

However, in contrast, most focus group participants were of the view that they, at an individual level, could not take much action to protect their properties from flooding, for example,

> *"I think people can do what they, you know, what they can do in terms of sand bags and whatever. But, if the river's coming up in a, you know, 3, 4 feet whatever; there is not much you can do. It has to be done on a wider level*." [Female, Stirling]

and

> *"You can get sand bags and I believe there are companies... that you can buy things... that will seal off your doors so that you can cope with a small flood, you know, not very... you know, few inches of water on a temporary basis…and I think that they [the council] probably will have to send [those products to] us at some stage"* [Female, Bonnington]

They expected that others, particularly the local authorities, needed to take actions to protect them from the effects of flooding. The type of actions they expected can broadly be categorised as actions before, during and after floods.

Before any floods or which some referred to as 'flood season', they thought that the waterways like rivers, drains and culverts needed to be cleared of blockages and debris and prepared for heavy rainfall while stressing that relevant responsible agencies like the local councils and the Government rather than individuals needed to do so, for example,

> *"Yeah and I think as well that there needs to be some responsibility taken for the actual river. The water board or whoever owns it, the council or whoever owns the actual land, should be doing inspections, you know, on a regular basis when the flood risk is goanna be at a high level*" [Female, Murrayfield, Edinburgh].

or

> *"... the drains and culverts being regularly cleaned and I mean that is just such a basic obvious thing to do. You know, if they were done, say they were done four times a year or something, then the water can drain away more*

> *quickly so it's very basic... and that's not something that individuals can do themselves. It's something they can only make pressure on [the council] at the last minutes"* [Female, Stockbridge, Edinburgh]

One of the participants from the Murrayfield focus group stated that the Government and the local councils needed to take more responsibility and protect them from floods. He thought that they were not acting on their responsibilities. Further, controlling development in floodplains and acting on people's concerns was also identified as an area where Government should take more responsibility, for example,

> *"I think Scottish Executive[or government [inaudible] these days could help with regard to planning policy and legislation…that they shouldn't allow things to be built on floodplains which will inevitably help"* [Female, Stockbridge]

Others identified areas where local authorities should take responsibility prior to flood events:

> *"So people's concerns, people have concerns, they should be dealt with. So if somebody's phoning about a car, fell-over tree... the council should act and tell the person that they are acting. You know what I mean, as quick, as quick as they can.* [Male, Bonnington, Edinburgh]

On the type of actions that could be taken during any flooding events, the participants expected that the local council and the emergency services should have a flood action plan and that the help during flooding events should be well organised with the emergency services, such as the fire & rescue services and the police, having been duly prepared. Further, the majority of the participants were unaware of any flood action plan for their areas, for example,

> *"They [the council and the emergency services] don't seem to have a flood plan for Stirling so they are unlikely to have flood plans for any other villages"* [Female, Callander]

and

> *"I'm not sure whether my area has a contingency plan"* [Male, 42, Stirling]

As identified in the earlier section, use of sandbags was the most popular flood protection measure among the participants. But many participants cited problems and issues related to locating sources of sandbags, for example,

> *"Well, I think, some action needs to be taken by others. Certainly, obviously the sand bags need to be provided by the council because we can't all have our own supply of sand bags in our gardens to hand. You know, that's not just practical"* [Female, Murrayfield, Edinburgh]

and

> *"I don't know where I would get those sand bags. Would council deliver it? I think we could have a…some storage of sand bags so people could go [and collect them]".* [Female, Murrayfield, Edinburgh]

The participants also recounted many instances of inadequate supply of sandbags and expected these to be delivered to them because of the effort needed in filling them up, and lifting and heaving them, mainly so when the elderly and disabled as well as women were involved, for example,

> *"There needs to be sufficient supply of them [sand bags] to make sure that all the people who feel that they are gonna be at risk can barricade their property. Because the last time, you know, people were fighting for them, there wasn't enough [supply]... I was in tears, yeah fighting to get the bag, yeah. So I think that's one of the measures that need to be put into place"* [Female, Murrayfield, Edinburgh]

Participants also mentioned that more formal support, for example, with moving possessions and sandbags, needed to be made available to elders and vulnerable people:

> *"You know, not everybody will be able to do that. Because elderly people obviously wouldn't be able to manage to carry them. But, you know, I think, something should be in place for able bodied and less able bodied people to benefit"* [Female, Murrayfield, Edinburgh]

Going further, one interviewee also delineated an evacuation plan for flood emergencies for elderly people:

> *"It's not so much, you know, you get Paramedics in Green. … For all I know, they have got a list [of elderly people] and if there is a flood warning they [should] go around the streets and pick them all up and …and if they do that, it's a good idea. But if they don't do it, it would be a good idea and I would like the credit for it, thank you*… [Male, 42, Stirling]

Further, some participants thought that local councils needed to be more accessible:

> *"We have judged it 10 O'clock at night [that we need sandbags] and decided not to get the sand bags because the council depot will not be open"* [Female, Stirling]

One participant from the Murrayfield focus group complained that after the floods they were inconvenienced a lot but they did not get any support from the local council. Further, the participants thought that there should be financial help available to them for flood proofing their properties because not everybody could afford the costs, for example,

> *"I really do feel, if you... if you are living in a flood area, there should be grants… not grants [but] if you fill in [and submit the expenses incurred] by a way of forms… or you hand over the receipt and have that… all of it... paid for. Because if local government is not protecting you then they should be trying to help you to protect yourself. Not everybody has the income to buy all these things [flood proofing products]."* [Female, Callander]

Some participants stated that when floods were expected to happen infrequently, say once in 10 years, it was not unjustified for them to seek help from the Government and the local council. In fact, they asserted that plenty of help including financial help should be available. Further, as many participants had identified mismanagement of floodwaters as among the main causes of floods, they were unwilling to share the financial burden, for example,

> *"Why should the residents need to buy these things [flood proofing products] when you are paying your water rates, etc.? And that's meant to manage the river. They should be putting better defences on. So why should you as a resident have to pay through the value of your property when you already share [the cost]"* [Male, Bonnington, Edinburgh]

Many participants supported this argument.

As mentioned in Section 6.3.5, being insured to cover damage to properties and possessions due to flooding was widely viewed as a necessity. However, some doubted whether they would be adequately covered while others were confident that one could get compensation covering the cost of damage from the insurance companies. Yet others narrated several incidences where insurance related issues were becoming a cause for concern and expressed a need for support from local councils and insurance companies in making their houses flood-proof.

In summary, the general view of the participants on responsibility for protection from floods was that at individual level they could not do much. Therefore they thought that protecting them from floods was primarily the responsibility of the local councils and the Government. However, it was seen that most of the participants were not adequately informed of the flood risk related agencies and their roles and responsibilities. They thought that in addition to better management of floodwaters, cleaning of waterways and stricter development controls, well coordinated and targeted help and advice should be available to them before, during and after floods. These included financial help, help for the elderly and less able people, guidance on flood-proofing products, being informed through better communication strategies and help in obtaining property and contents insurance which covered damage due to flooding.

However, participants of few group discussions also reported that their local councils had been making efforts to alleviate flooding and keep the people in flood risk areas informed about flood related issues. For example, participants from Murrayfield mentioned that the CEC was taking measures to ensure that sewage did not contaminate floodwaters and that the council had taken over the control of the reservoirs in the catchment of the Water of Leith. Similarly people in Stirling mentioned that their local council had started helping people in flood-proofing their properties but had to give up because of the spiralling costs.

Further, participants in Callander mentioned that the reservoir water controls had been computerised while participants in Stirling mentioned that their local council had an emergency action plan and that the local council had recruited two hydrologists.

Participants in Edinburgh mentioned that the local council had invested in the Edinburgh Flood Prevention Scheme and Water of Leith Early Warning System. However, it should be mentioned that the number of people having any information about action taken by the local authorities in their areas was very low.

The analysis presented in this section revealed why the majority of people, despite having been lived several years in their own properties in flood risk area and with previous flood experience and knowledge of the sources and causes of flood risk as well as the adverse effects floods can have on property, possessions, health and lives, did not take preventive and protective actions or did not have a plan for action in case of flooding. It clearly highlights the importance of the roles of the responsible authorities, most notably SEPA, local councils, Scottish Water and the Scottish Government, in raising people's awareness of their own and the relevant agencies' responsibilities, and warning the communities of flood risk. The analysis also showed that the communities lacked trust and reliance in the relevant agencies. Section 3.2.7, which especially elaborates on the role of trust in forming emic perspective of risk, highlights that lack of trust adversely affects the credibility of the communicators (Beck 1992), the process of risk communication and its outcomes (De Marchi 2000, Winnubst 2011, Kellens 2011, Janoske et al. 2012). It also states that trust can be restored through deliberation and dialogue with the communities (Löfstedt 2005, Janoske et al. 2012).

6.4 Sources of information about flooding

Under 'knowledge about flooding' section 3.2 also highlights the role of information availability in affecting flood risk communication. An analysis on this topic carried out using quantitative data was presented in section 5.3. This section details a similar analysis carried out using the qualitative data collected for the research. In addition to identifying the sources of the flood risk related information of the interviewees and focus group participants and their level of satisfaction about the information they had received through those sources, it also identifies the topics on which they expected further information to raise their awareness about flooding.

6.4.1 Sources of information and level of satisfaction

The interviewees and participants were requested to identify the source organisation or agency including media, type of information or information content and to comment on their level of satisfaction about the information.

It was found that the main sources of flood risk related information of the participants were their own observations and their interactions with other members of the communities. Participants in every focus group in Edinburgh mentioned that they were receiving local council newsletters every 3 to 6 months. However, they mentioned that the information was mainly related to what the local council planned to do with regard to flood risk, for example, investment in flood defence schemes and works, and had little specific information on preparedness related topics. A few participants mentioned attending exhibitions by the local councils and SEPA and having found them useful while few others identified the SEPA website as a source of information related to flood risk in their areas. The other main source of flood related information the participants had come across was weather reports on TV.

Other sources of information which the participants referred to were news articles in newspapers and magazines, news and weather reports on television and radio as well as some special features in newspapers and programmes on Scottish television which gave basic information. However, they mentioned that flood risk related news appeared to be mostly relevant to those living in England:

> *"Of course, there is like flood down South in England I have heard about all the time…like on the [television] and coming up with weather warnings and things like that"* [Male, 20, Haymarket, Edinburgh]

They also thought that there was not enough Scottish news or enough information on flood risk in Scotland:

> *"I think flooding is an issue… an English based issue... I think it is very much centred on English councils and English regions and all the information is based on England. I don't think there is much on Scotland ... Well, I mean… SEPA I suppose could be, but no… I never came across anything, particularly based in Scotland... and certainly not in Stirling… they haven't*

> *had any information on flood risk in Stirling".* [Female, 23, Riverside, Stirling]

Some participants mentioned that they had heard of the Floodline service but no participant mentioned using the service regularly. The reasons for not using the service varied widely. Some participants thought that the service was relevant to England only. This seemed to be due to lack of information but one participant mentioned that when he called up the service's phone number, the call went to England and he was not able to get any useful information. Another concern about Floodline was that the information provided was 'too general' and lacked any specific information. Further, it was said to be not updated regularly and containing out-dated information. Some participants stated that the warnings were not issued in time to take any action.

Except for some participants from the Stirling focus group and two interviewees from Edinburgh, all other participants expressed dissatisfaction about the flood risk related information they had received in the past with comments like 'could be improved a lot' to 'there was no warning in the past'. However, many participants, particularly in Edinburgh, were unaware of who does what in relation to flood risk information.

Further, many participants preferred having local sources of information, for example,

> *"I would say, when we came recently to the area, I would say that the information that seems to be easily available is pretty, pretty scarce really. I mean, if you know where to look up, if you know to look up SEPA internet site, if you got access to the internet then you can look into it. I would have thought that from what's come up here would be quite useful if there were actually local sources of information you could go to."* [Female, Stockbridge, Edinburgh]

But on the other hand, few participants were of the opinion that the relevant flood risk information might be available but needed to be delivered to them, for example,

> *"I am not saying information is not out, it's more just I haven't come across it."* [Male, 20, Haymarket, Edinburgh]

or

> *"You would have to look for it. It's not… it's not like that they give it to you. You'll have to go on the internet and look for it… or in the library or I don't know… look, look, yeah. You'll have to do it on your own as far as I see".* [Male, 21, Stockbridge, Edinburgh]

and

> *"I suppose if I have looked for [the information], it would probably be there. but I don't think I should have to look for it…. I think, councils need to be more proactive and communicating things… you know, there is going to be a risk and sort of pre-emps things… rather than waiting for the worst to happen and then giving out advice and information…Yes, I am personally responsible for my own property but if councils know… that have a large area that's at risk of flooding… I think, they should be providing information… and no, like I didn't have anything coming through my door, you know"* [Female, 23, Riverside, Stirling]

From the above, it can be seen that the participants were mostly dissatisfied regarding flood risk communication. They were poorly informed and mostly relied on their own observations for flood warnings. A few were aware of information sources like the Floodline but did not use the service due to its perceived lack of relevance and reliability. A further noteworthy observation is that the communities relied more on the local councils than SEPA for flood risk information and thought that the local councils have a responsibility to keep them aware and informed. This demonstrates that substantial improvements to flood risk communication strategies, which should include clarifying roles and responsibilities as well as providing information which the communities think they should have, are required to address these issues, which is further discussed in the next section.

6.4.2 Information sought to raise awareness about flooding

It is evident from the analysis presented in sections 6.3.1 and 6.3.2 that most of the participants were aware that they were living in a flood risk area and the above section demonstrated that the participants were dissatisfied about the flood risk related information they received. Building on the discussions presented in the previous section, questions were asked specifically to assess what further information the interviewees and focus group participants expected to receive for raising their

awareness about flooding. However, it is worth mentioning that well before these questions were asked, many participants were vocal in expressing their expectations about flood risk related information, thus confirming that this was an issue the participants thought to be important and relevant to them. But it should also be highlighted that they did not seek more information on causes and sources of flood risk or on effects of floods, with some even stating that they did not want any information relating to general flood risk in their area. It was found that their expectations for more information specifically related to three main topics: flood warnings, information relevant to flooding emergencies and information relevant to flood risk alleviation schemes in their areas.

The participants wanted to know about various aspects of a flood warning. This had also been the dominant topic of all the focus group discussion events. Apart from a few participants from the Stirling focus group, all other participants mentioned that they did not receive a flood warning during the earlier flood events in their areas. It was also noticed that very few participants were aware that a flood warning service was available.

The participants expected that they should be warned in time so that they could be in a position to move possessions. However, some participants thought that even if such warning information was available, they were not informed about the possibility of flooding. Instead, that information was just passed on to the police or to other agencies such as the local councils:

> *"My cousin, earlier on this year... she has a bungalow going up towards the New Royal Infirmary... and she [inaudible] at the doorway… early morning… and there was out two men at the door and two workmen, saying 'you have to move out because you are about to be flooded'. And she was! Right away! And being a bungalow… you are talking about things you are losing... her wedding photographs, her children's photographs, all gone. She was really upset. Now that the council should have... or whoever was dealing with it at that time…should have rang the people long before it flooded, and it flooded immediately. Those guys came and that was the house… but we can say before it floods, you know, get at least a few hours warning surely"* [Female, Bonnington, Edinburgh]

In line with the above, some participants stated that the police also were not informed about imminent flooding. Further expectations related to flood warnings were related to accuracy, measure of severity, specificity to particular areas, relevance and additional information like emergency contact numbers for further help. These are discussed below.

The participants emphasised the importance of accuracy of flood warnings, for example,

> *""…if you continue this [issuing warning] and nothing happens, people are just going to become complacent and like, 'Oh, it's not going to happen. They issued this warning three or four times and nothing happened in the past'". … [People may] just not take any notice of any of these warnings. So it's, it's important where the people that are issuing the warnings are accurate with them: as accurate as it can be."* [Male, 23, Colinton Mains, Edinburgh]

They also expected that the warning should involve 'some measure' of the risk involved, for example,

> *"…and also the level of flooding… you know… if it is going to be a serious flooding… or is there a tidal wave 10 ft high coming and rushing up The Forth or is it a case of a bigger puddle than usual…"* [Male, 42, Riverside, Stirling]

Some participants thought that the flood warnings were 'too general' and thus lacked specificity in terms of the areas that would be affected. A participant of the Callander focus group suggested zoning Callander and setting the risk levels for those zones. According to the participants, it would be helpful because the risk level in Callander was dependent on location – 'where you are in Callander'. They also stated that it would be useful if a flood warning also mentioned a local phone number to call should one need any further assistance.

Further, the participants were of the view that only flood warnings were not sufficient because they too used to monitor river levels. They also asserted that there was a time lapse between the flood levels on the SEPA website and their observed levels, that the information was not updated frequently and that flood warnings did not change before or after the floods, for example,

> *"There was [inaudible] one of the meetings that we had, somebody said that SEPA did actually issue a warning saying that riverside was at risk. But warning was issued at something like 5 in the morning and water came at our... from doorstep at 4"* [Female, Stirling]

Therefore, the participants stated what they expected was information on what was going to be the effect of tides and rainfall in the next 24 hours on the river level because they argued, what would happen in the immediate future was more important to them. They also expected that such a warning could also be accompanied with weather information like a 'shipping forecast'[12] so that they did not need to look up separate sources of information, for example,

> *"So for me it's the combination of both: level of the flood at that time and the forecast for the next twenty-four hours... Let us say you look at the site at Nine O'clock so it does give me information about Ten O'clock, Eleven O'clock or further"* [Male, Stirling]

Moreover, some participants were of the view that it would be better if such information was assessed at expert level together with local parameters like tide levels and local knowledge because, they thought, not everybody was good at that:

> *"I am not an expert. So I don't know by looking at the river when it is going to burst. ... [My] neighbours were out and [were] thinking of 'how high is the river going to come'"* [Female, Murrayfield, Edinburgh]

Contrary to the above view, some participants wanted to make their own judgements about flooding and expected only information relating to possible flooding. For example, participants from the Stirling focus group stated that they had received a "Recycling timetable" and that it would be useful if they could get tide information and when it was likely to rain heavily included in the same calendar so that they could make their own judgements about flood risk. They further stated that it would be useful if more data like tide levels, rainfall in the next few hours and current river levels at a particular location were made available to them directly to enable them to make judgements for themselves. Further, they also thought that such data would be useful for the emergency services and the local councils too. One view was that a digital

[12] A popular and well structured weather forecast for UK seas issued four times a day by BBC which has a very specific and consistent structure.

display, similar to motorway displays, should be erected near the river to display flood risk data during bad weather:

> *"I mean if physically there was a notice board down the river on the roadside that read flood risk, tide tables, river level... weather forecast and stuff you know, that would be useful."* [Male, Stirling]

To which another participant added that this was what their community was pursuing as:

> *"The council in discussion with the community had also said that they had agreed to put a marker system up… It would be a lot better near the boating club which is more accessible for everyone. That sort of marker where you can see what the fluctuation in the water is. If you are going to gauge that along with what everybody else has discussed… all the factors… that would be quite far a better warning system. And that's what the community… part of what the community wanted but the council haven't come up with the goods"* [Female, Stirling]

On similar lines, two participants from Edinburgh suggested putting markers with numbers on bridges in their areas so that people could see those and know the level of the river, for example,

> *"Do you know one thing that could be really helpful? And there is one…Put on bridges, painted wooden signs saying, 'one foot, two foot, three foot or one meter, two meter or three meter' and then people can see it. There is one on one bridge… That's a, you know, that's a really simple thing that people could do. Let them make their own decisions. Now that's the sort of information the fire brigade need to know…"* [Male, 50, Currie, Edinburgh]

Some participants suggested installing an alarm system on the river which would sound when the water level rose to a predetermined level as a means of warning people, and to test these alarms regularly:

> *"...or maybe you can have an alarm. You know, an alarm system, if the river gets to a certain level, you know they could sound an alarm so people are aware that they need to take precautions"* [Female, Murrayfield, Edinburgh]

and

> *"...because if you go to Japan, every lamp post got its Tsunami warning horn on it and they test them once in month... once a week..."* [Female, Callander]

On the information related to flooding emergencies, the participants wanted to know what the emergency action plan was, how the local council intended to help them and what the procedures were as:

> *"As it stands... as it stands now, if there is a flood... and the heavy water, what's the procedure now? Are we alone or is there somebody that we can go to or bags you can get from? Just for example it happened now, what would we do?"* [Male, Bonnington, Edinburgh]

and

> *"I would like to be more sure, what happens when they keep talking about ambulances and how we get to Stirling. And it is really important that is known. What happens if we get flooding and the main road is closed?"* [Female, Callander]

From the discussion above, it can be concluded that the information the participants sought and valued in terms of flood warning was information directly related to a situation where there was an imminent likelihood of flooding. Further, they expected this information to be area-specific and detailed:

> *"...you would want to know how much time you have, and you would also want to know where to go, you also want to know what route you can take to evacuate the area, you would also want to know where… if, if, if you got any health problems at all… or if you become sick you want to know if there is any sort of temporary... sort of ambulance stations or anything to go to. So you will need to sort of see this…so you also want to know if you are… if you were disabled or if you are ill then you want to know who to contact to assist in evacuation or if you want to know when this is going to happen as well. ….you would want to have a lot of this information even before a flood*

> *warning was [issued]…you would need that at least a couple of hours"* [Male, 23, Colinton Mains, Edinburgh]

While some participants were aware that there was a 'Community Risk Register', they were unaware about what it meant for them. The participants were unaware about the centres where they could take refuge in their areas should they need to evacuate in an emergency. Some thought that this was the school in their area while others thought it was the community centre. They also wanted to know what possessions they could take with them if they ever needed to be in such a centre. They wanted to know the local council emergency numbers they could call and get help and 'what the Emergency Planning Offices of the councils were doing'. None of the participant knew the Floodline number, some saying that it started with 0800. However, the interviewee who was a businessman admitted that he should have known the Floodline number but stated: "it's not impossible for SEPA to bring out a plastic card that you could put up on your board".

A female participant from the Stirling focus group mentioned that her neighbours were laughing at her when she was stocking sandbags. Her house was later flooded and she needed those sandbags. She thought that people were unaware of the severity of the issue and as such expected more efforts to educate people.

As discussed earlier, some of the participants were aware of the flood alleviation measures in their area and other areas too. However, in general, not many participants knew about these:

> *"[The council] improved the [control] or whoever has done it, [it] has improved the level control on the reservoir. To what extent does that reduce the risk? Has anybody got assessment on it? In other words, if there was another flood like, you know, and amount of water and the rain that happened in 2000... Just wondered if anyone [has] done the risk assessment of that situation."* [Male, Murrayfield, Edinburgh]

Many participants, particularly from Edinburgh, were unaware about the implementation of the flood alleviation schemes, including why it took so long for the Edinburgh Flood Prevention Scheme to be implemented and the financial details

relating to the scheme. Others reported that they had received information about such schemes, but among these, some complained that the information was not relevant to their area and wondered why they had been sent that information. Other participants mentioned that they had a quick read of such material and then binned the leaflets as they were not seen to be relevant to them. From this discussion, it is clear that communication to residents living in flood-prone areas was not focussed on topics whose relevance is immediately apparent to them. This finding is of great significance in structuring a flood risk communication strategy.

As the majority of the participants in every group stated that use of sandbags was what they would deploy in case of flooding, information relating to the availability of sandbags was important to them. Many were quite dissatisfied with information provided by the local councils on sandbags and wanted more information:

> *"No, there is no leaflet or anything. And when I lived in Riverside and they distributed the sand bags at the end of the street, I never knew anything about what was going on there. I would never know where to go and get sand bags."* [Female, Stirling]

or

> *"Yeah but, I mean, if we are finding out sand bags, you find out almost by accident. There is not any official information that I could actually put my hand on and look up to find out where I get sand bags or anything else.* [Female, Callander]

Finally, some participants wanted to know further details about flood insurance. Yet others wanted to know whether they needed planning permission from the local council to flood-proof their properties and more information on such products.

The above analysis demonstrates that issues raised by communities included inadequate information on flood warnings, information relevant to flooding emergencies and information relevant to flood risk alleviation schemes in their areas. They provided specific and detailed requirements for information. It included information on the information sources themselves and also on the contents of flood warnings, how and

when they would prefer them to be received, information on flood actions plans and the actions the local authorities and others were taking in relation to flood risk emergencies and alleviation.

The findings of this analysis are vital in that the analysis not only generated findings which support the findings of the quantitative analysis but also identified additional topics compared to the quantitative analysis. The findings also provide an in-depth perspective on what information the communities seek and helps in explaining their lack of action to protect themselves. Addressing these information needs through an appropriately structured flood risk communication strategy, it can be argued, would contribute to flood risk communication.

6.5 Media issues and usage pattern

One of the objectives of the research relates to informing media selection for flood risk communication; which involves two tasks: raising flood risk awareness and issuing flood warnings (see section 3.4.3). Media Synchronicity Theory has congruence with Habermas's Theory of Communicative Action in that both these theories are oriented towards development of shared meaning or understanding between the communicator and the target audience. This research examined whether Media Synchronicity Theory supports selection of media for flood risk communication. For examining this, two sets of data were collected, the first related to media issues like availability, cost, intrusion into privacy and technical or personal difficulties in using certain media, particularly so when these media would be used for flood risk communication purposes; and the second related to the media preferred by the communities (see section 6.6). This section presents analysis of the first set of data. The same 'media matrix' as shown in Table 4.1 was presented to the participants before seeking their views.

6.5.1 Media availability and usage pattern

In general, the participants thought that all the media in the media matrix, except the media where the communication has to be initiated by an external agency, for example public announcement system, was available to them. However, their usage was stated to be dependent on their personal circumstances and individual preferences. Further, even if available, it was stated that on an individual basis not everybody used any

particular media in the media matrix on a regular basis. The participants elaborated further on why they did or did not use a specific media, as discussed below.

Of the media listed in the media matrix, newspapers were stated to be readily available but it was said that not everybody purchased or read them. Further, according to one participant, there was no guarantee that everybody would see a particular article in a newspaper, and even if seen, would pay attention to it. Brochures, booklets, leaflets and pamphlets were reported to be available only if they were posted through the door, with one participant mentioning that these would actually be read 'only if they send a few.' Others complained that they had received none and some thought that one needed to visit a specific place like a local council office, a museum or an exhibition to obtain one. However, one interviewee stated that one could contact the local council and the local council would send one by post.

According to the participants most, except for some elderly participants, were thought to possess mobile phones and therefore a voice call or a text message was thought to be available to them all the time. Some reported not having a landline phone. Internet and email were stated to be available to most, with many reporting that they checked their email on daily basis. Further, many participants stated that location specific media such as landline phone might not be accessible to them because they could not be at home all the time. None of the participants intended to use television tele-text. Some participants stated that they did not have a radio or they did not listen to radio while some stated that they did not watch television. Similarly, some stated that older people did not use mobile phones and some stated that they did not buy newspapers. Further, some stated that they did not have computer or did not have it turned on all the time and therefore did not have access to internet all the time.

Thus, not everybody used every media, even if almost all the media were available to them. However, television, radio, internet and mobile phones in no particular order were reported to be the most frequently used media on a daily basis. These findings on media usage pattern are similar to the findings of the quantitative data analysis presented earlier in section 5.5. The analysis however was able to shed light on the reasons behind the media usage pattern.

6.5.2 Cost of media

Further, the participants were probed on the issue of the cost of media if used for flood risk communication purposes. The overall opinion of the participants was that they already used some of the media in the media matrix and therefore were already incurring a cost. Further, they stated that some of the media were free for example, free newspapers in the bus or even if priced the newspapers were cheap; brochures, booklets, leaflets and pamphlets were free, one did not need to pay for attending an exhibition or seminar and the local council did not charge for sending someone to visit their property on request. Therefore, they did not anticipate any additional cost to them if they used the media for flood risk communication purposes. However, some thought that if there was an associated cost like a charge for brochures, booklets, leaflets and pamphlets or cost for receiving text message or if the related information was broadcast exclusively on paid channels like Virgin or Sky, then cost could become a barrier because not all, for example, students, would be willing to pay for the information or mobile operator charges. However, some participants mentioned that cost could be an issue for the local council as the local council might need additional resources to print good quality leaflets and one participant questioned if it would be affordable to call everyone in the event of a flooding incident.

Thus, it can be seen that most participants were not concerned about the cost of media but thought that some people with lower incomes like students could face affordability related issues. There was also some concern about the costs to the local council. These findings are different than the findings of the quantitative analysis presented earlier in section 5.5 which found that use of internet, email and text messaging was associated with high cost.

6.5.3 Intrusion into privacy

The majority of participants were of the view that receiving a flood warning through any of the media was not an issue they would consider as an intrusion into their privacy, even if at other times such media could be intrusive:

> *"The landline phone voice call would drive me nuts. Because I hate when the phone rings and you get these automated messages on the phone [but] for warning purpose yeah I think it's still, still a quite good idea. But I would*

> *have to have the number up so I knew that, I would answer that. You know because I got the caller display"* [Female, Murrayfield, Edinburgh]

or

> *"Intrusive? No, if they are goanna tell me that our house was at risk of flooding - better than the water!"* [Male, Stirling]

or

> *"There is no such thing as an intrusion in these circumstances*" [Male, 42, Riverside, Stirling]

However, although the participants were generally willing to register to receive flood warnings by email and phone, there was a concern that their details could be sold off to commercial companies for marketing purposes. Further, one elderly female participant thought that a visit to her property could be 'quite intimidating' while another elderly female participant stated that a visit to her property was only desirable on certain occasions. But in general the participants thought that they would not view such visits to be intrusive if they were informed in advance, for example,

> *"A visit to your property by somebody, just turning up on the door? Fair enough if they advertise that beforehand to say 'there will be a visitor from our representative of the council coming to speak to you about this, knocking on the doors next Thursday'. Fine, a visit but with prior ...prior notice..."* [Female, Stirling]

Thus, in general, the participants were not concerned of intrusion into privacy if they were informed on flood risk through any media. It should also be mentioned that some participants did not want to receive any information directly as they preferred to choose their own information source or media. Thus, it can be concluded that although the participants had some privacy concerns, flood risk communication, in general, was welcome if they were informed before the communication. These findings are different from the findings of the quantitative data analysis (see section 5.5) which found that visit to property, use of email, phone calls, text messaging and public announcement system were associated with privacy concerns. However, the qualitative analysis above

established the reasons for this and found that the privacy concerns were mostly limited to prior information on any intended communication, such as a letter notifying timing of visit to property. As long as their personal information was not shared by the communicating agencies, individuals did not have further concerns. This is an important finding worth considering while developing a media strategy for flood risk communication. This also confirms Habermas's Theory of Communicative Action which proposes that social values, norms and beliefs (in this instance the issue of honouring privacy of the individuals while making contacts with them) actively shape regulatory forces while developing social order through communicative action (in this instance a need to inform individuals about a planned visit to their property, maintaining appropriate level of data security and confidentiality, screening visiting officers for being eligible to visit properties, etc). In addition to being applicable to the issue of privacy, this finding is also relevant to the cost of media discussed earlier and to technical or personal difficulties faced by individuals, which is discussed in the next subsection.

6.5.4 Technical or personal difficulty

This section analyses the responses on questions aimed at probing the thoughts of the participants on whether they would face any technical or personal difficulties if any of the media in the media matrix were used for flood risk communication. The nature of the difficulties stated by the participants can broadly be categorised as those related to the attributes of the media and those related to individuals. These are discussed below.

Some participants mentioned possibilities like not visiting the internet or checking their e-mails everyday or not being at home to receive the communication if called on a landline phone. One female participant stated that she was 'a bit worried about using modern technologies' to which many people agreed confirming that it could be a problem with some people, particularly elderly people. Some reported difficulties in attending exhibitions and seminars:

> *"Possible trouble would be with the... exhibition and seminars and the visit to property because depending on when they want to do it, you know, I might be at work. So unless they are going to be in times that suites me, that's the only issues I would be having and [the] rest [of the media] would be Okay"*
> [Female, Murrayfield, Edinburgh]

Similarly some participants expressed possible difficulties with hearing loudspeaker announcements:

> *"Because sometimes with double glazing you don't hear it if you do not keep your window open"* [Female, Murrayfield, Edinburgh]

Related to this, some suggested that those could be issued with associated flashing lights. Further, some participants had concerns of loudspeakers or sirens potentially panicking people, for example,

> *"… I don't think I would like that [public announcement system and loud speaker]. I think… do you mean, you know, like a siren type, yeah, air raid almost…I don't think I would like that. It would remind me of war time situation. I think that would certainly panic people…"* [Female, 23, Riverside, Stirling]

However, others felt that if people were made aware of them by testing like fire alarms, people would get used to them.

One participant described how she could not get any information when the electricity supply to her house was cut off due to floods as the information was available only on local council's internet site. Similar to this, a participant described how difficult it would be if electricity was unavailable:

> *"Yes but if we got our electricity turned off because we had a flood warning we will not have access to television, internet"* [Female, Stockbridge, Edinburgh]

To this, another participant added that one could use a mobile phone and that person then could inform others who did not have access to any other media. Exhibitions and seminars, even if available, were not preferred by most of the interviewees because of lack of time or lack of interest for unspecified reasons. In addition, some participants stated that there could be issues with the language of communication.

Thus, it can be seen that the media associated with technical or personal difficulties in using them varied widely although those were mostly electronic media. In particular it can be noted that the personal and technical difficulties were thought to be associated with the elderly. These findings are similar to the findings of the quantitative analysis

presented earlier in sections 5.5 and 5.8.5 which found that internet, email, text message were particularly associated with personal or technical difficulties. It was also concluded that a wide range of media should be used for flood warning purposes to take into account the needs of those who have technical or personal difficulties with certain media.

6.6 Preferred media for flood risk communication

This section details the analysis of the discussions which were aimed at identifying the most preferred media by the participants for raising flood risk awareness and warning purposes. The same 'media matrix' as shown in Table 4.1 was presented to the participants. It is obvious that some media due to their characteristics pertaining to the message formats – including capability to carry or transmit audio-visual information – as well as likely delay in transmitting the message would impose constraints or result in obvious preferences. In addition, there could be other factors such as availability, cost, technical or personal difficulty in using them as well as personal preferences, etc. which also may lead to individual preferences for certain media for flood risk awareness or warning purposes, or both. The analysis is presented in two sections, 6.6.1 and 6.6.2. Section 6.6.1 presents analysis on preferred media for flood risk awareness and section 6.6.2 presents analysis on preferred media for flood risk warning, the two communication tasks (see section 3.4).

6.6.1 Preferred media for flood risk awareness

Radio was most frequently cited as the preferred media, although some participants mentioned that they did not have a radio or did not listen to radio. This was followed equally by exhibitions and printed media like brochures, leaflets, booklets and pamphlets. Printed media were preferred mainly when they were posted to them and were addressed and were accompanied by a covering letter, for example,

> *"I think, certainly letters and leaflets and brochures are the most used and they are easier to use, but people get so much junk through their door that they just…, I don't think people look at them very much. But if it was, I think, if it was in an actual addressed letter someone might have to physically open and look at, then that would be good because I actually have to look at it …but if it comes… if it's bright and shiny and you know, a new face, I would just see it as a junk mail. I really would see it as something, you know,*

> *[whether] a warning or some sort of awareness, I would just see it as somebody is trying to sell me something… [the brochures] have to come with a covering letter explaining why you have got this…"* [Female, 23, Riverside, Stirling]

and

> *"I think it would be a good idea for the council or the water board or river [board] responsible for informing us, to produce a leaflet that they could advertise on the television saying that that this is going to be popping through your door. It's very important and then probably you would want to keep it. You know, to make sure that it has information on it to raise awareness and to provide telephone numbers. You know, what to do in an emergency, what to do if your property is flooded. Because, you know, there are lots people who just don't know what to do. So, I think, that would be a really good idea. Possibly they have got them [leaflets] and we just haven't had them. I don't know."* [Female, Murrayfield, Edinburgh]

or

> *"If I am never in a council building, I am never goanna have access to leaflets and brochures... And it would be a leaflet through the door. You can't just have a leaflet somewhere like in a library and hope that people use it, because library use or library uptake is very very low. The vast majority of people living in any particular street haven't been in a library. So if you have got a leaflet there, it is not goanna help them"* [Male, 42, Riverside, Stirling]

Brochures, booklets, leaflets and pamphlets were thought to be a 'good idea' as 'one can go back and read it' if it was at one's home. It was also stated that one would keep it and look for it when it was needed. An exhibition related to the flood prevention scheme in Edinburgh was reported to be useful, with one participant requesting more such exhibitions. This was reinforced by another participant who cautioned that 'some people threw the leaflets at the back of their drawers and therefore exhibitions would ensure that they saw the information. She further added that people also would meet others from the same area and they could benefit by discussions with each other during an exhibition. This, she thought, was important as people were living in those areas for many years and had a lot of local knowledge. Further, another participant suggested

that it would be much more beneficial if the exhibitions or road shows were advertised beforehand to ensure higher levels of attendance.

Television was the next preferred option for flood risk awareness. However, programmes were expected to be dedicated to that topic to ensure greater viewing. One participant even suggested that flood risk could be the theme of any TV soap episode, 'say where River City becomes Flood City'. Television and radio were thought to be particularly beneficial for elderly who could not get out and buy a newspaper or visit an exhibition. This also highlights that some people have 'needs' rather than 'preferences'.

A visit to their properties was the next preferred media by the participants. The participants thought that there could be a dedicated person responsible for flood risk awareness in a particular area, who had sufficient knowledge of that area and who should be contactable during flooding events. Further, newspapers were preferred by some participants, with participants from Callander asserting that newspapers were the only source of flood related information to them.

Internet too was preferred by some participants mainly because of its easy availability and accessibility at all times but also due to the availability of a wide range of information on various topics. However, as discussed earlier, there was thought to be accessibility problems if the electricity was switched off.

Some participants preferred a phone call whereas others preferred information to be placed in a local library. However, others reported that they had never visited a local library or local council offices. Newspapers were reported to be available easily and were not thought to be costing much but it was pointed out that not everybody bought them and that they were usually full with advertisements. One interviewee, however, mentioned that some newspapers were available for free in buses and everybody on the bus read them every day.

Tele-text was the least preferred media for flood risk awareness and many stated that they had never used it. Landline phone or mobile phone voice calls were thought to be inappropriate as, people did not like to be 'cold called' and thus was not preferred for

flood risk awareness. Text messages too were thought to be inappropriate mainly due to the limited information these could carry and thus were not preferred for flood risk awareness. Only two participants did not welcome visit to property for flood risk awareness purposes while others thought it to be appropriate but did not prefer one. Public announcement system was not thought to be appropriate for flood risk awareness.

It can be noted that the findings on the preferred media for flood awareness are slightly different from the findings of the quantitative data analysis (see section 5.6). It can however be observed that the preferred media in general are similar, although the order of preference is somewhat different.

6.6.2 Preferred media for flood risk warning

For flood warning purposes, it was found that in general all print media – addressed and unaddressed – were not preferred because of the obvious anticipated delay in receiving the message and instead electronic or new media were preferred. It was found that public announcement using a loudspeaker or siren followed by mobile phone text message were the most preferred media for flood risk warning among focus group participants. In addition, voice calls, radio announcements and visit to property too were preferred for flood warnings.

Public announcement systems like loudspeaker, loudhailer, megaphone or a siren was the most preferred media amongst all the participants. However, some participants cited issues like causing panic and inability to hear because of double or triple glazed windows. It was thought that the panic factor could be eliminated if the public was informed of the system whereas the hearing problem could be eliminated if there were associated flashing lights with the announcement. The participants, however, thought that it was effective only if somebody was in the property and the geographical area that needed to be covered was small.

The second most preferred media for flood warnings was mobile phone text messages amongst all the participants. It was thought to be immediate and most accessible by all the participants who had such phones. One participant also wondered if it was technically possible to send text messages to all mobiles in a specific geographical area:

> *"I say, the only thing we would do, I don't know if it's physically possible… to send a text to a geographical area… I think that probably [would] be the best one but not sure I am [how] feasible would it be…"* [Male, 42, Riverside, Stirling]

Another participant confirmed that there was a technology by which one could receive a message without needing to register and which as such eliminated the privacy issue raised by some participants. This was thought to be particularly beneficial to visitors to a flood prone area during a flood event. However, some participants thought that if they were registered, they would be able to receive the message even if they were away from their property, for instance, during holiday periods or while they were away at work. This was thought to be beneficial as they thought that they could enlist the help of their friends and relatives in such situations.

Because mobile phones are always on, in addition to the above, there was another benefit cited as well, that is, the likelihood that such messages would be received when other media were not accessible:

> *"…we were upstairs, party on. No radio, no telly and the first thing… was a fire brigade… knocking on the door… and I suppose if it was technologically possible to, say, send a text to that area saying, ' imminent danger of the river bursting banks', …if it was possible, it will be a good idea"* [Male, 42, Riverside, Stirling]

The third most preferred media for flood warnings was a voice call. This was because, the participants stated, they could be contacted anytime and did not need to rely on new technologies like internet and mobile phone (although many stated that they would not be having any objection if they were called on their mobile phone). Another equally preferred media by the participants for flood warnings were radio and visit to property by a responsible person or emergency services like police & fire brigade. However, people also cited difficulties in locating radio channels which broadcasted flood warnings and the timings of such broadcasts.

Amongst other preferred media for flood warnings were email, internet and news flashes on local TV. However, very few participants preferred internet and email for

flood warning purposes and some doubted the effectiveness of TV for flood warning purposes even if they preferred it, for example,

> *"Yeah, the television. but I find that hard to think about, because the channels… it is just complicated. I don't know if they can just cut into a program and say that…[issue flood warning].* [Male, 21, Stockbridge, Edinburgh]

or

> *"Yeah, though on the other hand, it's that me and my mates normally watch the music channel [on the television], so we might not… not actually be watching the channel where they post [broadcast] this warning. So that wouldn't be so good."* [Male, 20, Haymarket, Edinburgh]

As discussed earlier, some participants also thought that there could be permanent sign boards and alarms near the river (see section 6.4.2) and those would be useful for people who would like to make their own decisions and who did not have phones. Only one participant out of all the participants preferred tele-text because she thought that it was more likely to have local information than radio. However, none of the literature referred to for this research indicated that tele-text was used or was planned to be used for flood warning purposes. This option was included in the media matrix for the sake of comprehensiveness only.

As the media preferences varied widely, some participants stated that there was a need to understand individual preferences and maintain a 'risk register' for preferred methods of contact, for example,

> *"You [the researcher] could specify them [agencies responsible for flood warnings] if there was a register [specifying] how you wished to be contacted, what your preferred method was… which would save money because they won't be producing pamphlets for people who didn't want them, phoning people who didn't want phoned, etc."* [Female, Stockbridge, Edinburgh]

This not only justifies the importance of choice of media for the research but also its importance for developing flood risk communication strategies.

However, as the choice of media for flood risk warning varied widely, one interviewee summarised it from an implementation and feasibility point of view:

> *"...but if you wanted to talk to a lot of people in fast [instantly] and at the same time, it would be very hard. I don't think any one of these [any single media] works perfectly"* [Male, 21, Stockbridge, Edinburgh]

Thus, in summary the qualitative data analysis on preferred media for flood risk awareness and for receiving flood warnings suggested different media preferences. These findings substantiate the earlier findings on these topics carried out through quantitative data analysis. This analysis was useful as it provided insights into the reasons behind the preferences. It also highlights the importance of use of varied media for flood risk communication while cautioning that over-reliance on specific media which use modern technologies such as internet and mobile phones may lead to exclusion of certain population at risk of flooding from benefitting from the flood risk communication. These findings also demonstrate limitation of the Media Synchronicity Theory which takes into account only the characteristics of the communication task and capability of media and does not take into account the associated social norms, beliefs and constraints of the social actors; for example limitations of the communicator such as lack of resource to carry out face-to-face meetings or inability of some members of the public to attend meetings. These findings are further considered while presenting appraisal of Media Synchronicity Theory for flood risk communication tasks in section 9.5.2.

6.7 Summary

This chapter presented analysis of the proceedings of eight one-to-one interviews and six focus group discussions attended by 69 participants. The one-to-one interviews and focus group discussions were conducted as detailed in section 4.6 and 4.7, and analysed using tools and techniques as detailed in section 4.8.3.

As detailed in section 6.2, the ages of the interviewees and participants ranged from 16 to 81 years and the average age of the one-to-one interviewees was 29 years whereas it was 57 years for the participants of the focus groups. Further, each of the genders was represented equally by the participants (38 males, 39 females). Thus, the sample of

one-to-one interviews and the focus groups was broadly reflective of the adult population.

The analysis of the level of knowledge the participants had about flood risk in their area is presented in section 6.3. The analysis found that in addition to the rainfall causing rivers and drainages systems to surcharge and flood their areas, mismanagement of floodwaters and lack of maintenance of the waterways were perceived to be the main causes and sources of flooding. While the majority of participants were aware that they were living in flood-prone areas, there was considerable variation in levels of perceived risk across and within the multi-site focus group discussions. This emic perspective, which was informed by the 'lived' experience and an understanding of some other factors such as location of a property in relation to the river, was noted to be quite different than the etic perspective, which was based on a high level assessment of level of flood risk to these areas. There was evidence of in-depth understanding of the effects of floods on properties, possessions and lives. Participants also highlighted that certain groups such as children, elderly people and disabled people were particularly at risk in the event of flooding. Using sandbags was identified as the most preferred option for protecting properties from possible damage due to flooding. In summary, there was evidence of differing knowledge claims attributed to etic and emic perspectives which are argued, by Habermas's Theory of Communicative Action, to be addressed through generation of shared knowledge.

Although some participants were of the view that protecting their own property was an individual responsibility, most felt that they were unable to implement adequate measures at an individual level. Therefore, a widely held expectation was that the local councils and the Government were primarily responsible for protecting them and helping them in the event of flooding. A general lack of trust was also observed about the willingness of various agencies in protecting them from flood risk. Since lack of trust is known to adversely affect credibility, any communication efforts by the agencies without restoring trust in them would not be as effective as they would be if the trust is restored. Generally, participants expected better management of floodwaters, cleaning of the waterways, suitable changes in planning policies to ensure better development control and implementation of more effective flood risk communication methods.

Section 6.4 presented analysis of the sources of flood risk related information of the participants and their level of satisfaction with the information they had received through those sources. It was found that not much information on flooding was available and some information and news, when available, was not perceived to be relevant to their areas. As such, satisfaction with the flood risk communication efforts by the relevant agencies was generally low. However, participants demonstrated greater local knowledge of flooding in their areas which they attributed to their regular observations and interaction within the communities they were living in, thus demonstrating the reflexive nature of knowledge that is adjusted based on knowledge and experience. This also emphasises the value of public knowledge which is equally valuable as that of scientific, technical, administrative and political knowledge. The additional information they sought was mainly related to flood warnings and information which could be useful during a flood event. They elaborated on various expected and preferred ways and formats of communicating flood warnings to them. Further, they also wanted to know about the flood alleviation measures in their areas and the progress of these schemes. This demonstrates the process of reflexive modernisation proposed by Habermas who contends that the forces of social change come from within; which in this instance is the information demanded by the communities to inform and rationalise their behaviour.

The analysis presented in section 6.5 details the media usage pattern of the participants and issues relating to specific media. Although most of the media were available to them, their usage was found to be dependent on their personal circumstances and individual preferences. They did not consider cost of the media to be a significant barrier for flood risk communication and they did not perceive privacy an issue if the communication involved credible and appropriate flood risk information. However, they were concerned about their contact details being passed onto other agencies. This demonstrates the governing role of social values, norms and beliefs on choices and preferences of communities, consideration of which is one of the principles of Habermas's Theory of Communicative Action.

Section 6.6 presented the views of the participants about their preferred media for flood risk communication. It was found that for flood risk awareness purposes radio, exhibitions, printed media and television were most frequently cited as the preferred

media whilst public announcements followed by a mobile phone text message and phone call, radio and visit to property were the media most commonly preferred for flood warning purposes. These findings are further discussed in section 9.5.2 while discussing the applicability of Media Synchronicity Theory for informing media selection for flood risk communication.

The analysis presented in this chapter validated the findings of the quantitative data analysis carried out in Chapter 5 and also contributed by identifying reasons behind the surprising findings of quantitative analysis. The findings of the quantitative and qualitative data analysis of data gathered from communities, together with the analysis of qualitative data gathered through interviews of the relevant agencies which is presented in the next chapter, will be analysed together in Chapter 8.

Chapter 7
Interview Data of the Agencies

7.1 Introduction

As stated in the methodology (see Chapter 4), interviews of the agencies which are responsible for flood risk assessment and flood risk emergency response in Scotland were carried out to fulfil the second objective of the research (see section 1.9): to review communication objectives and efforts of the responsible agencies. In Scotland the agencies responsible for warning and informing the public in relation to flooding are the local authorities, police, fire & rescue service, ambulance service, health services and Scottish Environment Protection Agency (SEPA). As stated in section 4.4, the agencies were identified by referring to the Civil Contingencies Act 2004 and after discussion with the Scottish Environment Protection Agency.

For the research, the agencies were requested to nominate appropriate officers for interviews. The nominated officers included:

- two officers of the flood risk communications unit (a manager and a communications officer) of the Scottish Environment Protection Agency (SEPA)
- an officer each from the emergency planning and response related responsibility of the Central Scotland Police (CSP) and Lothian and Borders Police (LBP)
- an officer from the Central Scotland Fire & Rescue Services (CSF&RS)
- an officer tasked with emergency planning and response from the Stirling Council (SC) and
- an officer from the Bridges and Flood Prevention Unit of the City of Edinburgh Council (CEC)

The interviews were specifically aimed at deepening understanding of the flood risk communication responsibilities of these agencies and how these agencies were fulfilling their responsibilities. The analysis is presented in two broad sections: section 7.2 which discusses the views, activities and future plans of the agencies relating to raising flood risk awareness and section 7.3 which discusses the same aspects relating to flood risk

warning. This analysis also provides information about the etic perspective of flood risk – the perspective which is associated with the agencies. The analysis also provides information on the synergy of the communication efforts of the agencies with Habermas's Theory of Communicative Action, appraisal of which is one of the objectives of the research.

Section 7.4 builds on the discussions in these sections to identify gaps and overlaps and lessons for partnership working whereas section 7.5 summarises this chapter.

7.2 Analysis of flood risk awareness efforts of the agencies

The analysis is specifically aimed at evaluating and understanding in greater depth the perceptions of the agencies related to their responsibilities for raising awareness about flooding: how did the agencies identify the localities for raising flood awareness; on which topics did the agencies provide information; whether the agencies tailored the information for specific groups of people, and if so, which were those groups and how was the information tailored; which media did the agencies use for communicating flood risk awareness raising messages; whether the agencies worked in partnership with other agencies, and if so, which were those agencies; and lastly whether the agencies had any future plans related to flood risk awareness raising, and if so, what were those plans.

The analysis also examines how the flood risk awareness efforts of the agencies compared with the principles of Habermas's Theory of Communicative Action, specifically whether the agencies drew on the accumulated experience of the communities to create shared meanings; whether the social norms, values and beliefs were accommodated within the flood risk awareness efforts of the agencies; and whether right conditions and means for discourse on flood risk awareness were employed. The findings will be analysed together with the findings of the quantitative and qualitative data analysis of data gathered from communities to appraise the usefulness or limitations of Habermas's Theory of Communicative Action for flood risk communication.

At the outset, it is worth mentioning that Central Scotland Police (CSP), Lothian and Borders Police (LBP) and Central Scotland Fire & Rescue Service (CSF&RS) stated

that they were not involved in any flood risk awareness raising activities whilst citing that it was responsibility of SEPA or the local councils. As such, the analysis presented in the following subsections does not include their views.

7.2.1 Responsibility for raising awareness about flooding

This section explores the understanding of legal and other responsibilities of the selected agencies with respect to making the public aware of flood risk in their areas. SEPA stated that they were carrying out some awareness raising efforts although they were not legally responsible for carrying out these duties as:

> *In terms of the flood risk awareness... while we have not had any statutory duty to provide flood warnings and raise awareness of flooding generally, it is an accepted duty that we have taken on and have delivered. However, we do have a statutory duty in the planning process to provide information about flood risk when consulted on planning applications by local authorities.*

However, when asked about their responsibilities in terms of warning and informing the public about flood risk in relation to the Civil Contingencies Act 2004, the response provided was as follows:

> *Warning and informing? Yeah, we are Category 1 responder and under Civil Contingencies Act that means SEPA obviously has a formal duty where we have flood warning information then we are obliged obviously to share that in the best way we are able to. Until 2011 that way it's a passive system… passive awareness raising... which is through Floodline service - online and by telephone. At the same time the SEPA flood warning duty officers notify the police services when there is a risk of flooding.*

From the above response, it is clear that a change in flood risk communication efforts was under consideration or was anticipated to come into effect from 2011 or so. This is discussed further in section 7.2.8. It nevertheless is noteworthy that SEPA perceived their role to be passive rather than an active role as specified by the Civil Contingencies Act 2004 and SCG arrangements (see sections 2.3 and 2.5.1).

When the same issue was raised with the local councils, the City of the Edinburgh Council (CEC) stated that they only had responsibility related to the planning process[13]. CEC stated that it had achieved some flood risk awareness and that there was not anything which they were specifically required to do regarding flood risk awareness. However, CEC contended that, contrary to SEPA's statements above, SEPA was proactive in flood risk awareness and perceived it to be SEPA's responsibility and added that they did not want to confuse people by providing flood risk awareness information. The police and the fire & rescue services too had similar views as discussed in the introduction of section 7.2. Similarly, Stirling Council (SC) too contended that SEPA was proactive in flood risk awareness but further added that under the Civil Contingencies Act 2004, Stirling Council had 'clear responsibility' for warning and informing the public before, during and after floods.

From the above paragraphs, it is clear that none of the agencies identified in this research except Stirling Council viewed raising flood risk awareness as one of their responsibilities. However, it can be noted that although SEPA did not perceive it to be a legal responsibility, they were involved in some flood risk awareness raising activities, which was also supported by the local councils, police and the fire & rescue services.

Further, SEPA and the local councils identified a lack of resources in undertaking such initiatives. However, this is contrary to the expectations of the communities who are expecting such information, not only from SEPA but the local councils as well, and as such it can be recommended that to ensure that the communities are appropriately informed on all aspects of flood risk, the awareness efforts of these agencies should be supported through providing them with the resources, so that they can invest in people and technology.

7.2.2 Identifying localities for raising flood awareness

This section presents analysis of the criteria applied by the agencies for identifying localities or geographical areas where they carried out flood risk awareness raising

[13] when planning applications by individuals and developers are made for developing land, for example constructing houses, constructing watercourse crossings or building flood prevention schemes

activities. SEPA stated that they used a variety of criteria while choosing an area for raising flood risk awareness:

> *We select... in conjunction with hydrologists in each of the areas... we select specific areas to raise awareness. So that will be probably areas that possibly suffered from flooding in the past year, areas where there has been high risk or places that we have not targeted but we are aware that they are not in some flood warning scheme areas or we have request from local authorities that like us to do some activity in their areas that are at high flood risk.*

Further, the officers explained that SEPA had tried to target wider communities as opposed to concentrating on a specific area because, they argued, flood risk has wider effects which extends beyond a flood affected area:

> *Well basically the criteria would be places like, you know, towns. So not everybody in the town will be at risk from flooding but it could still affect them, for example, you know, there may be... the local routes may be affected by flooding, you know, house might not be at risk but if you are travelling through a flood risk area, then it could affect you. So, we do try to do [awareness] targeted at flood risk area... communities, but also would generally be aware of the wider community that might not be directly at risk... but flooding still could affect them or their family, you know, the people they know, their businesses or, you know, elsewhere.*

Since CEC was of the view that their responsibilities in relation to flood risk awareness were only limited to the planning process, the areas identified for awareness raising efforts were stated to be the areas where flood prevention schemes were planned. In contrast, SC stated that they had carried out detailed flood modelling of the River Forth basin from Callander to Stirling using detailed LiDAR[14] topographic data and they thus had very detailed information about the properties at risk of flooding. Further, they stated that they had studied historical flood information and knew where flooding had 'traditionally' occurred in the past. They, therefore, knew the 'hot spots' (areas that are known to be prone to frequent flooding which the interviewed officer termed as also 'wet spots' because those areas became wet when flooded). Those 'hot spots' or 'wet

[14] LiDAR stands for Light Detection and Ranging, a technique used to collect topographic data mainly by airborne laser sensors

spots' were said to include not only specific properties but also 'bits of roads' and that they were holding 'fairly accurate' information on such areas. They further added that they also referred to SEPA's Flood Map (see section 2.5.1) to identify potentially vulnerable areas. CEC also stated that they too were providing information on properties and areas that they knew could be at risk of flooding to SEPA where their knowledge was mainly attributed to historical flooding records they held.

From the above, it is clear that SEPA did not emphasise identifying and targeting specific areas or communities. Instead their efforts were targeted at larger communities, as they believed that flood risk had a wider perspective and everybody was prone to be affected by floods in some way. This belief is attributed to the etic perspective. The larger communities, which were explained to be the whole town or village, were chosen as a reaction to recent flood events or the requests by local councils. While this can be said to have some benefits, a well devised plan of action for flood risk awareness, which identifies areas for flood risk awareness based on well evaluated parameters, such as better analysis of the causes and sources of flood risk, demographics, expected socio-economic impact, etc., can be argued to be much more efficient in terms of resources and also in terms of the effectiveness of such efforts. It is noteworthy that, contrary to the principles of the Habermas's Theory of Communicative Action, none of the agencies consulted communities to identify areas for flood risk awareness and thus could not benefit from the knowledge of local flooding held by the communities. It should be stated here that although SEPA intended to carry out more targeted flood risk communication efforts, these were oriented towards providing flood warnings through Floodline (see section 7.3.8) through short messages with the aim of providing links to their and local councils' websites and a phone number rather than flood risk awareness efforts. In contrast, SC had invested in some efforts in identifying areas at risk of flooding by using SEPA's Flood Map, carrying out specific detailed studies and also referring to historical flood information. CEC clearly took a different approach by concentrating their efforts only in areas where flood prevention schemes were planned. As such it can be seen that the approaches taken by the local councils on raising flood risk awareness varied significantly. For a consistent approach to flood risk communication, it can be recommended that such differences should be eliminated through sharing information and partnership working. It is also noteworthy that none of the agencies consulted communities or held dialogue with them for achieving this

particular task. Thus, the etic approach was found to be not oriented towards 'communicative action' which involves consulting communities in order to generate shared knowledge and understanding.

7.2.3 Topics for flood risk awareness

This section identifies the topics related to flood risk awareness on which the agencies had provided information to the communities living in areas at risk of flooding. SEPA stated that their efforts were mainly concentrated on promoting Floodline and SEPA Flood Map but they also provided information on various other topics:

> *Well basically we promote the Floodline service... To promote that service we also provide advice and guidance for what people can do to prepare for flooding. So the action they can take in advance, that they can do now in case a flood hits. So they can prepare 'flood kits', making sure that they have got adequate insurance, having a family flood plan just like, you know, like a fire plan and who is responsible for doing different roles within flooding. So what's SEPA's role, what's the council's role and what you can do, what to do if you are flooded, you know, the first steps you can take... Specifically educate people, how floods actually can affect you. You know, how they can enter your property, about products you can actually buy, you can put... Basically we are trying to educate people that it's their responsibility to protect the property and they can't rely on the council to deliver sand bags… We provide lots of information about what we do and we also got the Flood Maps available, online that, you know, we tell people, you know, if you want to check if you are at risk... if the area you live in is at risk then you can use the Flood Map as a tool to know that*

The CEC stated that the topics on which the local council provided information to the people were mostly related to the flood prevention schemes which the local council was promoting. However, they stated that they also regularly included other information related to what people could do in the event of a flood.

The SC stated that the local council was committed to providing information to the public on various topics related to floods, as below:

> *We provide information to people in flood risk on various topics like here are things you can do, here are things we will do if that happens, but prior to happening there are some actions you can take and if you are in the flood risk area you can put flood guards and so on, you might consider keeping things of value upstairs, you know, it's just about knowing what to do, for example being aware of the weather and checking... that's... you know, SEPA and checking on Floodline. So we are giving them that sort of information... it's to say them 'you are in a flood risk area... and you should be aware of this... and have you thought about what mitigation you might take, you know, you want covers on your drains, flood guards, what do you want to do? Do you have your own stock of sand bags, these sort of things*

Again, contrary to the principles of Habermas's Theory of Communicative Action and similar to the finding presented in the previous section on identifying localities for flood risk awareness, no evidence of consultation with the communities to include their views and requirements in deciding the topics for flood risk awareness by any of the agencies could be found. From the information provided above, it is evident that the topics on which SEPA and SC provided information covered a number of topics, in contrast to the information provided by CEC. However, the topics were decided by the agencies and did not reflect the needs and expectations of the communities. Therefore, it is not surprising that despite the efforts of the agencies as stated above in this section, it was found through the quantitative and qualitative data analysis presented in previous two chapters that such information did not reach the communities and that whatever information the communities had, the sources of these information could only occasionally be traced to SEPA or the local councils. This highlights the inadequacy of the flood risk awareness efforts of SEPA and the local councils.

7.2.4 Information tailoring for specific groups of people

This section examines whether the information provided by the agencies was tailored in any way for different groups of people, and if so which were the groups and how was the information tailored. SEPA stated that during awareness campaigns, hydrologists from those areas were involved in providing area specific information. Further, they were in the process of developing tailored information leaflets that would be targeted at specific communities. They stated that those leaflets would contain area specific information, for example, pictures of flooding, flood history and flood warning information specific to that area. SEPA further stated that they organised plays in

schools and the information was tailored to that age group (school children). Further, they also stated that they tailored information for businesses which involved information on business continuity plans[15] for flood emergencies and in addition information on how SEPA could help businesses was also available. Although the school-plays and information for businesses were described as being tailored for specific groups of people, these did not include dialogue with the audience but mere presentation of the information. This, thus, formed only a one-way flow of information instead of the two-way communicative action proposed by Habermas's Theory of Communicative Action.

SEPA also stated that they were considering other issues like compliance with The Disability Discrimination Act (1995 & 2005)[16], also known as DDA, and providing information to community leaders who can disseminate that further to specific language based communities:

> *We are looking at language issues. So, for instance, for the south side of Glasgow we have the White Cart and Black Cart [flood warning] schemes. There are a greater number of Gujarati speakers within that area. And we need to think about the ways we provide some type of information, even if it's only the very basic information, because we do not have the resources to be multilingual for messages. That's never going to happen. So the way that I think, we need to get around that is to provide some basic information for community leaders within those areas. ...that would include a variety of languages including French and Lithuanian, Polish and Slovenian, as up do Cantonese, Mandarin and obviously Gaelic as well. ...For instance in the Angus area of Scotland you got a large migrant worker population where they are coming for fruit picking seasons.*

[15] Set of documents, instructions, and procedures which enable a business to respond to accidents, disasters, emergencies, and/or threats without any stoppage or hindrance in its key operations, also called business resumption plan, disaster recovery plan, or recovery plan. Ref: http://www.businessdictionary.com/definition/business-continuity-plan.html

[16] According to the Directgov website (Directgov 1995), The Disability Discrimination Act (DDA) 1995 aims to end the discrimination that many disabled people face. This Act has been significantly extended, as the Disability Discrimination Act 2005. It now gives disabled people rights in the areas of employment, education, access to goods, facilities and services, including larger private clubs and land-based transport services, buying or renting land or property, including making it easier for disabled people to rent property and for tenants to make disability-related adaptations and functions of public bodies, for example issuing of licences. The Act requires public bodies to promote equality of opportunity for disabled people. It also allows the government to set minimum standards so that disabled people can use public transport easily.

However, these considerations of targeted communication with specific groups of people, for example language based communities, did not include proposals of direct contact with such specific groups which can make it difficult to arrive at shared understanding of flood risk. Thus, any such communication would only be a top-down or one-way communication as opposed to the two-way communication proposed by Habermas's Theory of Communicative Action.

On this topic, the CEC stated that the information which the local council provided was tailored for people who were likely to be affected and protected by flood prevention schemes and that the information was provided in specific areas only. However, they stated that the purpose of the communication was not to raise people's awareness about flood risk but to let the people know what the local council intended to do in their area, for example, why they were erecting a 2 m high wall at the back of their house.

The SC stated that rather than tailoring the information for specific groups of people, they tried to quantify the risk and convey that information to all the people in those areas. The quantification was transformed into categories such as 'areas with flood history' (hence at high risk of flooding), 'areas shown in SEPA's Flood Map but never flooded' (hence at potential risk of flooding). Thus, specific areas were identified for flood risk communication. When compared with the CEC on this aspect, it can be seen that the efforts of SC differed significantly in a positive way. Although the categories of quantification are quite simplistic, the quantification process could be beneficial nonetheless as the communities would have better information of historical flood risk in their areas. Therefore, communication with the communities would help to develop and build shared understanding of flood risk compared to only etic risk assessment. However, the information flow is again one-way flow of information rather than a dialogue with the communities as proposed by Habermas's Theory of Communicative Action.

From the above paragraphs, it is clear that at the time of the research, none of the agencies tailored their information for any specific group of people. However, it can be seen that SEPA intended to tailor the information they provided to comply with The Disability Discrimination Act (1995 & 2005) and also intended to reach various language based communities - although only through community leaders of such

language based communities citing resource difficulties in being multilingual. These findings too nevertheless highlight the inadequacy of the flood risk awareness efforts of SEPA and the local councils, particularly in ensuring that the communication is relevant to and reaches various socio-economic groups of people.

7.2.5 Media used for awareness raising

This section identifies the media used by the agencies for raising flood risk awareness amongst the communities living in areas identified to be at risk of flooding. The media used for flood risk awareness are expected to perform the conveyance task of flood risk communication (see section 3.4.3), where the conveyance task, according to Media Synchronicity Theory, is associated with the development of knowledge, generating understanding and building a mental model by sharing mostly new information through communication.

SEPA stated that they were using a wide range of media for example, leaflets, local newspapers, community newspapers or magazines (for example, Ben Ledi View of Callander Community Council), local council newsletters or magazines (for example, Glasgow City Council's magazine), radio, DVD and face-to-face meetings, for example by securing a stand in a community event and organising a flood-fair. They had also arranged events like towing an information-trailer in towns and villages and arranging school plays. They further stated that they had distributed some commercial promotional products like 'wellie boot key rings', pens, bookmarks, and other stationery with the Floodline number printed on it and even a hoarding on a rugby club during matches. However, amongst the media, local community magazines were their most preferred media followed by the local press. They thought that local council magazines were useful but limited in terms of frequency of publication. They stated that the reason for preferring the above media was the direct relevance of the media to the target communities, indicating their (etic) perception that local communities were more likely to read those. They also stated that most of their flood awareness raising activities were concentrated in the months from October to March but opportunities outwith these months, such as summer fairs, too were explored.

SEPA further mentioned that some promotional materials like bookmarks as well as leaflets were made available to libraries. They also used promotional opportunities such

as local sports events and they had advertisements customised for urban and rural areas displayed on local buses. The posters in urban areas had quick short messages as people would only have a short time to look at the poster due to their speed of travel. Although these can be said to be useful approaches for raising awareness of flood risk and developing information seeking behaviour in the communities, the research presented in the previous chapter using data generated from the communities did not present any evidence of success of the above mentioned communication approaches. Further, according to the Media Synchronicity Theory, such quick and short messages can only be useful only when the audience is already thinking about them or when they can correlate the presented information to a pre-developed mental model.

SEPA further stated that they had previously transmitted short messages on TV and radio but this practice was discontinued due to budget constraints. They also reported that they had used the ITV's micro transmission region option for effectively delivering the messages to the target communities in specific areas, but again this was not pursued for the same reasons.

The CEC stated that the local council is required to provide information on flood prevention schemes to the people who live in the vicinity of the scheme or are identified to be affected by the construction of the scheme. This exercise forms part of the consultation process for planning applications for these flood prevention schemes. Although this may appear to constitute a dialogue with the communities, the consultation process for planning applications is limited to only raising concerns about the scheme rather than involving communities in flood risk areas as legitimate partners who share power for deciding alternative solutions and outcomes. The information about the schemes was provided to the relevant people through flood prevention newsletters.

The CEC further added that an emergency plan was under preparation and that maps identifying flood risk areas were available in the libraries for interested people to view. The emergency plan was also said to be being made available on the local council's website.

When asked about the media used for raising flood risk awareness by the SC, the local council stated that they were trying to do so through their Community Services unit as well as through the community council structure, which also ensured community engagement. The SC further stated that they had written to the people who they knew were living in properties identified to be at risk of flooding and had advised them about the flood risk in their area. However, according to SC, the information posted on the local council's website and that published through the local council's newsletters was their main media for raising flood risk awareness amongst the people. The SC further stated that they were always looking for innovative ways of communicating with people living in flood risk areas.

From the above, it is evident that although SEPA had preferences for certain media, apart from some opportunistic efforts, there was no evidence of a clear media policy or strategy for selecting and securing space (or time) for flood risk awareness messages and preparing and distributing the awareness raising and promotional material. Further, it was stated that most of the flood awareness activities were dependent on funding from Scottish Government and were mostly concentrated during the 'flood season'[17]. The CEC published flood awareness messages through specially prepared flood prevention newsletters whereas the SC used their website and local council newsletters and posted addressed letters to the properties they knew to be at risk of flooding for raising flood risk awareness amongst people. Thus, it is evident that none of the organisations had identified specific media for regular flood risk awareness raising efforts. Thus, the conditions and means of discourse (dialogue with the communities) on raising flood risk awareness suffered from practical constraints such as lack of funding to not creating conditions for such a discourse and not utilising the most suitable means of communication (media selection). This finding, thus, goes against Habermas's Theory of Communicative Action which requires that suitable conditions for discourse be created. It also highlights lack of consideration to selecting suitable media, discussed further below.

Comparing these findings with the quantitative and qualitative analysis of data gathered from communities clearly demonstrates that the above stated efforts of SEPA and the local councils have not been as successful as should be expected in reaching the

[17] time of the year during which most of the flooding events appear to happen

communities at flood risk. None of the interviewees and participants of the focus groups indicated coming across any messages or promotional material from SEPA, except for some awareness that some information was available on their website or through Floodline. Although some evidence of communication from the local councils was generated, there were other issues such as the relevance of the messages to the flood risk to their area. It can also be noted that SEPA provided information in a passive manner, such as making it available on website whereas the communities expected that such information should be more actively 'communicated' to them. Although the local councils have been proactive in communicating some information, they clearly fell short of ensuring that the communities received the information, it was relevant and were using it effectively. In particular, an absence of a media strategy was evident across SEPA and the local councils. A media strategy is expected to address selection of media which can deliver intended messages in a desired format and at specific times. The selection of media can be informed by consultation with the target audience and making references to various media theories; some of which are presented in section 3.4 and one of which, Media Synchronicity Theory, is discussed further in section 9.5.2. A media strategy should further include, at the minimum, securing funding for the communications or media campaign and deciding timing and channels for the communication.

7.2.6 Evaluation of awareness raising efforts

The purpose of this section is to identify whether agencies evaluated their flood risk awareness efforts and if so whether the feedback received was used to improve their services. SEPA stated that such evaluation exercises had been carried out in the past but were very expensive and they could no longer afford those, they stated that they 'simply don't have money, that's all'. However, they were supporting research carried out by the Environment Agency, the Cabinet Office and research organisations which examined people's reactions to specific types of messaging and codes, iconography terminology and what people were most likely to respond to. Although these studies may help in understanding how message are received and processed by communities, these may not specify any variations or preferences which are specific to certain communities. For example, a display board similar to a motorway sign board near a river was found to be preferred by communities in Stirling, which such generalised studies may not specify.

The other indirect means of ensuring an effective service, according to SEPA, was an evaluation of the number of hits to the SEPA Floodline website. However, this measure of effectiveness – number of hits on the website – does not appear to be a reliable measure for evaluating flood risk awareness raising efforts for several reasons. These include the inability to examine the reason for increased hits and to identify the residences of the people who were using and not using the site. It was also not possible to ascertain why certain people may not be using the site and there was an obvious lack of any feedback to improve the service. The officers from both the local councils reported that no specific targeted follow-up relating to uptake of flooding information had been undertaken although SC cited that there had been evaluations in the past of whether communication from the local council had reached the public and whether there were any concerns related to it.

Thus, in summary, neither SEPA nor the local councils were carrying out evaluation of their flood risk awareness efforts. Thus, they had no access to usefulness of their communication efforts in terms of meeting the needs of the communication and also were deprived of any opportunity of improving communication. In essence the agencies did not draw upon the knowledge of the society and did not adjust the risk awareness efforts reflexively based on the knowledge and experience offered by the society. The communication was only 'top down' communication without any two-way communication to inform such an approach (see section 3.5). Thus, it can be recommended that the agencies should carry out evaluation of their awareness efforts and that as the agencies have cited lack of resources, the agencies should be supported by appropriate funding bodies like the Scottish Government in securing the necessary resources for their evaluation efforts.

7.2.7 Evaluation of partnership working

The purpose of this section is to understand whether the various agencies worked in partnership with other agencies and to evaluate their views related to partnership working. It has intrinsic links with SFRM introduced in section 1.2 as SFRM advocates adaptive governance of flood risk through a multi-layered web of horizontally and vertically aligned stakeholders and therefore also with the various aspects of 'stakeholder engagement' presented in section 3.5.1. The Partnership working arrangement also fits well with Habermas's Theory of Communicative Action which

advocates spaces for deliberation and communicative action. The communicative action is particularly aimed at reaching a shared understanding on issues marred with different viewpoints and knowledge claims. It thus values the knowledge and experience of all the individual partners and helps in developing new knowledge on the issue, which takes into account their individual viewpoints, values, norms and beliefs.

As far as the issue of raising flood risk awareness is concerned, SEPA reported that they were working closely with the local councils and that apart from a few local councils they were getting excellent support. In addition, SEPA stated that they were working closely with the Scottish Flood Forum and that their other principal partner was media like the BBC which, they stated, played an important role in raising awareness about flood risk as well as warning and informing the public at the same time.

Both the local councils stated that their partnership working arrangements with SEPA in relation to flood risk awareness raising had worked well in the past and that they would concentrate on maintaining the relationship by assisting SEPA in their awareness-raising efforts.

However, SEPA cited some examples where central government websites such as www.direct.gov.uk, which despite being UK wide service, provided information related to only England and Wales. SEPA further stated that there was a common misconception amongst public that the responsibilities of SEPA and Environment Agency were the same (see section 7.4 for further details). SEPA were of the view that partnership working has resulted in net customer benefits as there was greater clarity and understanding of 'who does what' and it also tended to contribute to a build-up of synergy. This view was reflected by the local councils as well.

Unfortunately, none of the agencies, except contact with community councils by the local councils up to an extent, cited any direct consultation or involvement of the communities at risk of flooding either prior or after their flood risk awareness raising efforts. The role and the importance of community engagement considering communities as legitimate partners has been emphasised earlier in section 3.5 whereas it is evident that this aspect has largely been ignored by the agencies. As such it can be recommended that the agencies should not only work in coordination with each other

but should also involve the communities as legitimate partners to ensure that their flood risk awareness efforts meet the objectives of flood risk communication (see sections 1.3 and 1.4) and also that of SFRM. Crucially, the communities should be taken on board as a legitimate partner to ensure that the flood risk awareness efforts comply with the principles of Habermas's Theory of Communicative Action for them to be relevant, useful and effective. Additionally, consideration may need to be given to other aspects of partnership working, such as funding arrangements, to make it more robust.

7.2.8 Future plans

As stated in the previous section, both the local councils had expressed their willingness to support SEPA's efforts in raising flood risk awareness. The SC mentioned that they were looking for innovative ways to communicate with the people.

SEPA stated that flood risk awareness raising activities were funded by the Scottish Government and as such were dependent on the willingness of the government to fund these activities. However, they stated that many changes were taking place internally within SEPA and there was some uncertainty about the future. They stated that because SEPA would be working towards expanding the contact database of people and businesses in flood risk areas, it was likely that they would have more direct contact with people in the future to raise awareness about flood risk. An improved level of contact with the communities would certainly offer more opportunities of drawing on the experience and knowledge of the communities; including the social norms, values and beliefs in the flood risk awareness communication and creating the most suitable conditions for dialogue and usage of more appropriate media for communication – and therefore a communication which has 'communicative action' at its heart. As stated in section 7.2.4, SEPA also intended to tailor the information, such as area specific flood risk information, communication which complies with DDA and to reach more linguistically diverse communities. Their future plans did not involve consultation with the communities at risk of flooding although they stated that they were closely monitoring research by Environment Agency and other research organisations. However, such an initiative cannot be taken as a replacement for more direct contact with the communities since the literature (see section 3.2) suggests that their flood risk perceptions and communication needs are a result of the characteristics of the specific communities and local circumstances – the emic perspective. It is also noteworthy that

the local councils are reliant on SEPA for flood risk awareness while the communities expect the local councils to be the key agency responsible for providing information on flood risk awareness, and in addition for protecting them from flooding.

7.3 Analysis of flood risk warning efforts of the agencies

Similar to section 7.2 which applied Habermas's Theory of Communicative Action to analysis of the flood risk awareness efforts of the agencies, this section presents an analysis of the views, activities and future plans of the agencies related to flood warning. The analysis is, in particular, aimed at evaluating and understanding in greater depth the perceptions of the agencies related to their responsibilities for warning about flooding; how agencies identified the localities for this; what information agencies provided in a flood warning; whether the agencies tailored the flood warning for specific groups of people, and if so, which were those groups and how was the information tailored; which media did the agencies use for flood warning; whether the agencies worked in partnership with other agencies, and if yes, which were those agencies; and lastly whether the agencies had any future plans related to flood warning, and if so, what were those plans.

7.3.1 Responsibility to warn of flood risk

This section explores the legal and perceived responsibilities of the organisations with respect to warning the public of flood risk. CSP stated that their role in relation to flood warning was reactive rather than proactive and that they did not have any understanding of or training in the science related to flood forecasting. They further stated that they routinely received intelligence from the Met Office, local councils and SEPA and that they were aware of the fact that the information from SEPA could be up to 24 hours old whereas information from the local councils could be up to date as they knew that some of the local councils had their own equipment to measure the river levels. They stated that CSP did not warn the public directly but carried out warning responsibilities as the lead member organisation of the Strategic Coordination Group (SCG):

> *…we don't go out broadcast to people, you know, 'there is a flood warning' or anything like that. We don't do that. We do not have the resource to do it. We don't have the police officers on the ground to do that because I am sure you are aware of all the arguments that are in the news… police resources what they get used for*

Being the lead member organisation of the SCG was also linked to an ongoing role in influencing and liaising with the media. Thus, they were stated to be undertaking flood warning responsibilities in an indirect way. In addition, during emergencies they stated that they assisted other agencies in communicating flood warnings directly to the public.

A similar stand on responsibility for warning the public was stated by LBP. However, their arrangements related to warning the public varied substantially from the CSP command area. The Scottish Borders Council area under LBP's command was said to have put in place arrangements to communicate flood warnings to the public which were unique to that area, such as mobile phone text messages and phone calls. LBP in the Scottish Borders Council area was also reported to use water level measuring equipment which their officers could take to key known locations for water level measurement.

CSF&RS stated that although warning and informing public was a responsibility they had under the Civil Contingencies Act, they were not carrying out that activity in isolation but were working in partnership with the SCG. Therefore, these agencies did not provide any further information on this topic. On this topic, both the local councils stated that it was SEPA's responsibility to warn the public and that they did not carry out warning activities directly. However, because their officers were active and were seen in the flood risk areas during a flood incident, flood warning activities were carried out indirectly by their officers at tactical (ground / field) level.

The responsibility to warn the public of potential floods in their areas was clearly identified by all the interviewed agencies as being the responsibility of SEPA. However, when asked whether that was their legal responsibility, SEPA provided no comment stating that their comment might be misconstrued but stated that it was a responsibility that SEPA had taken on, on a proactive basis. As such it is clear that, at the time of the research, no agency was willing to accept responsibility for warning the public of flood risk. However, it is also noteworthy that the agencies, directly or indirectly, were involved in warning the public of flooding. It should be added that under the recently implemented act, FRM(S) Act, SEPA now are responsible for issuing flood warnings in Scotland (see section 2.3.2).

7.3.2 Identifying localities for flood warning

This section presents analysis of the criteria applied by the agencies for identifying communities or geographical areas for issuing flood warnings. The CSP and LBP stated that they had not been involved in identifying areas for flood warning but were aware of areas potentially vulnerable to flooding and that they were working as part of the SCG. They stated that SCG had more detailed information contributed by other member organisations of the group.

The CSF&RS, as mentioned earlier, stated that they were not carrying out flood warning activities in isolation. However, they were well aware of the flood risks in their command area and in addition, were receiving information from the Met Office and therefore were able to identify potentially vulnerable areas in advance of flood incidents.

SEPA stated that their identification of areas for issuing flood warnings was based on Met Office forecasts and communication with other agencies such as the local councils and Scottish Water. SEPA would then monitor the rivers in the areas where heavy rain was predicted and then issue flood watches based on their judgement. However, they stated that SEPA was unable to provide detailed flood information as to which specific communities would be affected. The flood warnings were general in nature which has also been corroborated by the consultation with the communities for this research. In addition, SEPA stated that they were unable to issue flood warnings for pluvial flood or where there was no Flood Warning Scheme[18] implemented.

SEPA stated that the implementation of a flood warning scheme was dependent on many issues like funding and availability of resources, requests from local authorities, availability of suitable equipment, suitable sites for locating data acquisition equipment and duration of data records available to enable a reliable prediction to be made and the lead time that was possible for a flood warning to be beneficial, say 3 hours. Thus, some practical constraints posed limitations to SEPA in creating spaces for deliberation as proposed by Habermas through his Theory of Communicative Action.

[18] Flood Warning Scheme for a river is where meteorologists, hydrologists and hydraulic engineers work together with the aim of issuing flood warnings to stakeholders which includes the public and emergency response agencies (SEPA 2010).

From the above, it is quite clear that the identification of areas for issuing flood warnings was mainly dependent on Met Office forecasts and whether a Flood Warning Scheme was implemented for a specific area. The above findings also highlight the limitations of SEPA's flood warning efforts. Firstly, the warnings can be said to be passive rather than active; mainly because the police mentioned that the information could be up to 24 hours old and also because SEPA provided warnings on monitoring of rivers based on Met Office forecasts – similar to the action taken by some members of the communities. Further, this exercise also revealed the 'general' nature of the warnings issued by SEPA as opposed to the detailed specific information required by the communities, and about which the communities and other agencies too (see 7.3.7) had concerns. Therefore, it is no surprise that the communities sought more information which was relevant to them (see Chapter 6). This particularly shows a gap in understanding of the requirements of flood warnings on the part of SEPA. The findings also highlight the fact that SEPA, in addition to being able to only provide 'general' flood warnings, was inadequately equipped with providing warnings for all the areas in Scotland.

7.3.3 Topics for flood risk warning

This section identifies the topics on which information was provided by agencies while issuing flood warnings to communities living in areas at risk of flooding. The topics on which CSP provided information to media were reported to be mainly related to travelling routes or road closures. In addition to the media, the information was also said to be provided to various other interested organisations like The AA, RAC, Trainline[19] and various bus companies. The officer from LBP stated that their officers would go into the flood warning area and provide people with further related information like advice on putting the flood defences up (for example, sandbags and flood guards), contact numbers and website addresses for further information as well as information on locations where they could get sandbags.

The local councils stated that they only provided information to the public when a flood was imminent and the locations of the shelters if people needed them. They further stated that they would provide additional information if members of the public

[19] The AA (The Automobile Association) and the RAC (Royal Automobile Club) are motoring companies while Trainline is a train company

contacted them. However, they also cited problems with phone lines and staff getting overwhelmed during emergencies, and also difficulties in staffing the phone lines at night.

When asked what information was communicated in the flood warnings, SEPA stated:

> *It's a very interesting question. What's communicated now is not the same that was communicated six months ago and no longer would be the same in the future. The reason I said that is because there has been a tendency in the past to communicate quite dry data rather than information, if I can put it that way. So an example would be… one of the warning says, "Continuous rain has been falling for so many hours… over 10, 20 more millimetres is expected in the next few hours and it will be affecting the river such and such. You are advised to keep an eye on area and your local radio, TV.." What it doesn't say of course is this will affect the ASDA car park, affect the road X,Y and Z, you know, the amount of rain … its goanna continue and its almost certain to lead to flooding therefore people who live in the X,Y,Z areas should be aware of this. So it didn't include enough geographical and relevant terminology for those to be able to say that. And that's one of the problems that we are improving on. Message improvements are a big part of what we are doing. And so in longer term, the messages will only have better meaning for the people but they will also be action oriented. They will include more specific ways that people can take actions… The messages that are sent out will be very short… that will be 160 chars or similar. They will then link people into the Floodline service and more detailed information will be online and by phone as well. It will also contain links to,… I mean certain areas… so for instance, if a local authority has a helpline, it will be linking to that*

This comment suggests that SEPA acknowledged that the flood warnings issued lacked information which people living in flood risk areas could immediately act on but also showed their reflexive adaptive policy to improve message continent and format. It reinforces the findings relating to the information people expected in a flood warning and further shows SEPA's orientation towards ensuring convergence of flood warning messages – that the message would be understood by the audience in a manner that the communicator wishes.

From the above discussion, it is evident that the police, as the lead agencies within the SCG, were providing information related to flood incidents and road closures to the media and about protecting properties and lives to the public directly. However, it is noteworthy that they acknowledged that the information could be old and hence irrelevant. Although they asserted that media were informed, it was found that people were not sure about where to look for information and which TV channels or radio stations transmitted information on flood warnings. These are, thus, one of the very important issues the relevant agencies need to address which should be addressed by implementing a media strategy.

The local councils were not equipped to actively provide information related to flood warnings to the public. Although SEPA had been issuing flood warnings and indicated that they were working towards improving the quality of the warning messages, again similar to what the local councils, other agencies and the public had pointed out, the local councils, police and fire & rescue services were only contacting the public when flooding was imminent. This infers that SEPA and sometimes the other agencies of SCG had sufficient information to communicate to the communities, but comparing these with the findings from the data gathered from communities, such information was not actively shared with the communities by utilising the most suitable media for issuing flood warnings. Thus, it can be suggested that along with making the communities aware of the sources of information, the agencies also need to ensure that they actively communicate whatever information they have rather than holding to the information to themselves.

The other important finding from the analysis is related to information on community flood action plans produced by the agencies, mainly by the local authorities but also by SCG. To ensure that the warnings are useful, the public needs to be aware of the flood action plan which contains information on the community level plan of action in case of flooding, information on whom to contact, location of emergency shelters and other information such as what people can carry with them and availability of medical care, etc. However, the analysis of the data gathered from the communities has revealed that such information was not communicated to the public. The local councils expressed frustration about this shortcoming and also cited an example when they could not find a single person to occupy a flood evacuation centre. Contrary to the expectations of the

communities, such information was not prepared even though SCG was said to have a generic emergency plan but it had a shortcoming of not specifically been tailored to address flood risk emergencies. Interviews of the agencies also cited this shortcoming. It was stated that in the past police had carried out such activities to an extent by dropping leaflets from door to door but that they had stopped this due to lack of resources to carry out such a resource intensive exercise. As such, it can be recommended that the SCG, through their partner agencies, should support dissemination of community-wide emergency action plan to the communities. It can further be recommended that since flooding is a specific kind of emergency requiring specific actions compared to other emergencies such as war, a terrorist attack or hazardous chemical gas leak, (which are defined by the Civil Contingencies Act 2004 as emergencies, see section 2.3.1 for the full definition), Scottish Government or SEPA should prepare a flooding-specific community-wide emergency action plan and take measures to ensure that the communities are aware of its availability.

7.3.4 Information tailoring for specific groups of people

This section examines whether the warnings issued by agencies were tailored in any way for different groups of people, and if so which were the groups and how were the warnings tailored for those groups. Both, CSP and LBP stated that the information they put out (published) was typically tailored for the incident and for the specific media used for communication rather than groups of people. For example, if a local flooding event involving only a few properties was predicted or anticipated, no information was put out to national level media like the BBC. Instead officers would inform the local council to put up road diversions signs if needed. However, if the scale of the predicted flooding was anticipated to be larger (this is relative and was decided by the lead agency), in addition to the local council, local media would be informed so that they could transmit information on road closures. Therefore, depending on the severity of a particular flooding event, it was up to the public to find out whether such information was available in any of the media.

The local councils stated that they had some knowledge of vulnerable groups such as disabled people living in their areas and that they were working with health services to arrive at a mechanism to further enrich their database. In addition to health services, the local councils also expressed concern in accessing data which was held by their own

council's other units citing that there were many databases to refer to and crucially that there were data security issues in assessing such data. In addition, the data was said to be generally a week old rather than being up to date. As such, they were unable to provide any flood warnings specifically tailored to vulnerable (from flood risk considerations) members of the public although they used to consult with the community councils and people to identify such people who may need additional support during flooding emergencies. SEPA, too, stated that their warnings were not tailored to different groups of people. As such, it can be seen that tailoring of flood warnings for any specific groups of people was not undertaken by the agencies although efforts were made to indentify vulnerable people.

This finding again has consequences to flood risk communication and hence how flood risk is managed to minimise loss of lives and damage to property and possessions. The communities had clearly identified that a large percentage of the population, especially the elderly, was unable to take any preventive or protective action prior to and when they were flooded. In addition to the elderly, there could be many specific groups, such as single parents, people who do not understand the language of communication, immobile persons, or any other groups who may not be able to receive such warnings due to media related difficulties and/or respond to such warnings. As such, not tailoring the warnings can have severe consequences and therefore, it can be recommended that the agencies should identify the specific groups of people for whom the warnings need to be tailored in order to minimise impact of flood risk.

7.3.5 Media used for warning

This section discusses the media used by the agencies for communicating flood warnings to the communities living in areas identified to be at risk of flooding. The media used for flood warning are expected to perform the convergence task of flood risk communication (see section 3.4.3), where the convergence task which follows the conveyance task, according to Media Synchronicity Theory, is associated with transmission of short messages to generate shared meaning for flood warning.

Both CSP and LBP stated that their services had a Media Cell which was responsible for handling communication matters. The information was primarily communicated to major media like radio and television and was also available for other media, for

example, the print media, to pick up. In addition, the other members of the SCG were contacted directly by telephone and email. As such no media was generally used for communicating with the public and the public was not informed directly by the police. However, CSP stated that during an emergency, their officers would go door-to-door to warn people whereas the officer from LBP stated that their officers would go into the areas predicted to be at flood risk and drop leaflets. They would also go into these areas with loudhailers and warn people. In contrast, the officer from CSP said that loudhailers would potentially cause panic and they did not use these for that reason. This was unexpected because the Grangemouth area, which is under the command of CSP, has sirens installed for warning the public in a chemical pollution incident. However, when referred to those sirens, CSP stated that the threat from floods to lives cannot be said to be of the same scale as a chemical pollution incident.

The LBP stated that by using leaflets and loudhailers, their officers would further inform the public of additional media sources like radio, TV, internet websites and contact numbers if they needed help or further information. By providing this information they hoped that everybody would be informed as they could get further information from at least one of the additional information sources or media. They further stated that the SCG decided on the quickest way to provide information in a particular situation. It was also mentioned that the Scottish Borders area had special arrangements to provide further information by mobile phone text messages and phone calls and that these were being used extensively in that area. However, the choice of media used was also stated to be dependent on the time of day. For example, they stated, that if the warning needed to be issued at say 3am in the night, they preferred going out with loudhailers instead of dropping leaflets, phoning people or using a text messaging service. Further, it was stated, the warnings were issued to the public and other member organisations of the SCG at the same time.

The CEC stated that they were only occasionally involved in door-to-door door knocking and did not broadcast warnings to people directly. Similar information was provided by the SC. However, the SC also stated that they had a hotline connection to the local radio station and thus they could provide flood warning information to the station directly. The radio station would then arrange to transmit the warning almost instantly.

SEPA said that their warnings were communicated through the Floodline service via internet and phone. However, the public needed to make an effort to use their service. They also stated that they had robust arrangements with the media and also with other partner agencies working under the aegis of the SCGs. They also stated that they were planning to use newer technologies (media forms) like 'Twitter' and 'Facebook'.

From the above discussion, it is evident that the police, as the lead agency of SCG, were primarily involved in coordinating with the media for communicating flood warnings to the public whereas SEPA's flood warnings were passive. Although the police and sometimes the local councils tried to warn the public directly, no formal media strategy to ensure that flood warnings were communicated directly to the public existed. It can be observed that most of the flood warnings were broadcasted or transmitted (on TV and radio) to a general audience or made available through internet and phone and it was up to the public to look for warnings through various media. It should, however, be remembered that the communities were not certain about the media or information sources they should refer to. Thus, in addition to making the communities aware of the media, the agencies also need to make sure that the communities also were aware of the information sources. As stated in section 7.2.8 and below in section 7.3.8, SEPA had planned to increase their contact database to communicate directly with the public which can be acknowledged as a welcome step in this direction.

7.3.6 Evaluation of warning efforts

The purpose of this section is to identify whether the agencies evaluated their flood warning efforts and if so whether the feedback received was used to improve their services. Both the police services were not evaluating whether their warnings were received by the public. LBP acknowledged that this was a potential gap. Further, CSP recognised that the warning methodology at that moment was not foolproof, for example, people may not answer the phone, may not check the voice messages received when they could not answer the phone or may not access the internet if they did not have access to those media and that it was a potential deficiency. The local councils did not evaluate their flood warning efforts but stated that they were committed to improving their contribution as best as they could by working in partnership with the SCG. SEPA stated that their evaluation was indirect - by evaluating the web-hits and

the number of calls to the Floodline during flooding events, which, as stated in section 7.2.6 cannot be said to be a robust evaluation methodology.

From the above discussion, it is evident that the agencies were aware of the potential deficiencies in the flood warning service and that no formal and credible evaluation mechanisms existed. As recommended in section 7.2.6, the agencies need to be proactive in evaluating their flood warning efforts to ensure the effectiveness of their efforts, in terms of communicating warnings through the most suitable media, and in terms of delivering the message in a format which generates shared understanding.

7.3.7 Evaluation of partnership working

This section evaluates the partnership working arrangements of the agencies. Partnership working is associated with Habermas's Theory of Communicative Action which proposes that communicative action, such as partnership working, generates new knowledge which values the knowledge and experience of all the individual partners whilst also takings into account their individual viewpoints, values, norms and beliefs.

All the officers of the identified agencies interviewed for this research were generally satisfied with the partnership working arrangements for flood risk communication. They commonly acknowledged that various tasks were involved when it came to handling flood emergencies and no one agency had the know-how of all the related issues. Therefore, they were satisfied that each of the agencies was aware of each others' capabilities and limitations, and thus had realistic expectations of each other. They unanimously recognised that partnership working was the best way of handling emergencies, that the public was benefitting from it and that the government resources were being used efficiently. They stated that there were some overlaps at times (for example, the members of the SCG received flood warnings from SEPA as well as from the Met Office) but under the SCG, various issues were discussed, post-incident briefings held and responsibilities agreed. This exchange of information and views enabled Integrated Emergency Management (IEM) and reduced the potential for conflict. Thus, it is evident that the agencies were of the view that they were satisfied with the partnership working arrangements and also thought that it was the most effective way of dealing with flood emergencies.

However, it should be noted that although the agencies expressed satisfaction about their partnership working arrangements, except for a few gaps and overlaps (see section 7.4) which were said to be the focus of ongoing continued evaluation, their partnership working arrangement crucially lacked the involvement of the communities at whom their efforts were aimed at. Referring to the principles of social theories related to risk communication, mainly the role of community engagement in risk communication for the purpose of reaching agreements over issues under consideration – primarily Habermas's Theory of Communicative Action, it can be argued that such efforts may be perceived to be useful by the communities only when such engagement initiative is actually undertaken. This was supported by the findings from the data gathered from communities where the communities were not satisfied with what, when, how and by whom the flood warnings were communicated to them.

7.3.8 Future plans

The police and fire & rescue services stated that the expectations of them at times could be unrealistic because flood warning was not their core business or due to lack of resources. But they stated that they were committed to performing as best as they could during a flood emergency. However, as far as warning the public of flood risk was concerned, they stated that they would continue to work in partnership under the aegis of the SCG and support its aims and objectives in relation to dealing with flood risk.

SEPA stated that substantial new developments related to flood risk warning in Scotland were taking place as:

> *The next stage forward for flood warning development in Scotland is the Direct Dissemination Program. And that's delivering flood warnings directly to those who are registered and within flood risk areas and to raise awareness in those areas and to get the people who are actually at immediate risk of flooding from rivers and sea. We are creating target area maps of each of the flood warning scheme areas and then we are dividing all of those into smaller community flood warning areas … like an onion ring. And each of those areas will be mapped against National Gazetteer information so that we can have names, addresses against properties and each of those areas will be marketed or contacted directly through communications such as community engagement events, direct mail or contact through the local authority. So it's going to be very-very targeted.*

The above, including their future plans mentioned earlier in this chapter, indicates that SEPA have planned to substantially improve their strategy to warn communities at risk of flooding. Particularly, it is noted to be congruent with the views of the communities where they argue that the level of risk of flooding was dependent on where in the floodplain their properties were located. Such initiatives can therefore be expected to go a step further in ensuring that the warnings the communities receive are relevant to them. This involves a lot of work, particularly assessing the risk of flooding in more detail through upgrading of infrastructure and systems as compared to the flood risk assessed through the SEPA Flood Maps, but also ongoing contact with the communities to create shared understanding as proposed by Habermas's Theory of Communicative Action, and which was clearly lacking at the time of the research, to understand how their flood risk perceptions are shaped and how they match with SEPA's perceptions.

7.4 Gaps, overlaps and lessons for partnership working

The agencies also cited numerous gaps which needed immediate attention. One of the cited gaps was making sure that emergency action plans were developed specifically for flooding emergencies and that the public were aware of them. The second gap relates to the timing and accuracy of the flood warnings, which is elaborated here in more detail. The warnings were said to be not available to the agencies sufficiently in advance of an event. The agencies needed sufficient warning time for organising and mobilising their personnel and equipment and for making sure that the flood evacuation centres were ready and all the affected public could be moved to safety in good time ensuring that their health was not adversely affected and that the public could save their possessions. This seemed to affect all the agencies including police, fire & rescue services, ambulance services and the local councils. These agencies also expressed their concern about the effectiveness of SEPA's flood warnings which were planned to be transmitted through their Floodline service. The concerns related to how the public would react to the messages and reinforced that unless the warnings were relevant and accurate, over time the public would stop paying any attention to these messages. Addressing this would affect especially how SEPA carries out their flood warning activities. The agencies, in particular SEPA, pointed out that the rainfall and river level monitoring network has evolved from the need to monitor pollution in the water bodies and was not sufficiently equipped to issue timely and accurate flood warnings and thus were not adequate to estimate flooding to the point where 'people could actually get out of their

properties'. Other agencies acknowledged that it was a difficult task due to the rainfall pattern and topo-geographic setting of Scotland where the warnings could not be provided earlier, such as two days in advance in the Americas. Thus, it can be recommended that SEPA should be reviewing their flood related data acquisition systems (rainfall estimation and gauging such as rainfall- radars and rive gauging stations), flood prediction systems (hydraulic models, topographic information, information on flooding extents in the floodplains) and ensure that they have well trained staff who can issue timely and accurate flood warnings, rather than general flood warnings, to increase the relevance, specificity and hence usefulness of their warnings.

The next gap in this direction, which can better be termed as a shortcoming, is related to the ability of the agencies to employ sufficient resources. This was a common theme of the difficulties which all the agencies reported facing and which can therefore be argued to be better addressed by the Scottish Government rather than the individual agencies. Nevertheless, it can be argued that it is the responsibility of the agencies to make the Scottish Government aware of their requirements and coordinate among themselves to ensure that they support each other's efforts, such as identifying sites for river and rainfall monitoring, sharing flood risk estimation / prediction models and any studies they have carried out as well as sharing of and training of personnel.

On the topic of overlaps, the local councils expressed a need to clarify their roles and responsibilities to the public, clearly stating that SEPA can only issue flood warnings but if they need any assistance they should contact the local council, police, fire & rescue service or the ambulance depending on their circumstances. SEPA also stated that they were aware of this ambiguity on clarification of roles and responsibilities and also a public misconception that SEPA was the same as Environment Agency in England and Wales who, unlike SEPA, are also responsible for flood defences. They also stated that they had other duties such as advising on planning permissions for developments near water bodies, pollution prevention and control and waste management licensing which sometimes leaves a negative impression amongst the public because of the regulatory actions that SEPA have to take and that these negative impressions sometimes affect their credibility and trust. However none of the data collected for this research indicated any influence of such a perception in the

communities. The lack of credibility and trust was found to be mainly due to SEPA's and other agencies' inability to provide assistance and advice to the communities.

SEPA also stated that following the recommendations of Pitt Review (Pitt 2008) they had created a joint flood forecasting centre together with the Met office (called Scottish Flood Forecasting Service) which ensures that meteorology and hydrology works together in accessing risk of flooding to the communities. They also stated working with Scottish Water to address flood risk from reservoirs. However, it should be noted that under the Reservoirs Act (2011) now SEPA have the responsibility of managing reservoirs and this is expected to result in better management of floods due to the increased control they can exert on managing reservoir water levels. At the time of submission of this thesis, this Act was not enacted fully. They also reported working with coast guards, NGOs, Royal National Lifeguards Institution, Chamber of Commerce, Federation of Scottish Businesses, Association of British Insurers, various health departments through Health Protection Scotland and with different utility organisations through the Utilities Super Contingency Group which includes agencies related to telecoms, transport and Scottish Hydro. SEPA also expressed their inability to issue flood warnings where the source of flooding is other than rivers or high sea levels. However, they stated that they were working in that direction where they would be able to issue other types of flood warnings such as pluvial flooding arising from insufficient capacity of drainage systems.

Finally, it is worth restating that none of the agencies had given due consideration to include communities as legitimate partners in the process of flood risk communication. The public is seen as only the receptor of information and the communication efforts are mainly limited to one-way, indirect and passive communication. Together with the overview of gaps and overlaps presented above, it can be stated that the agencies and communities would benefit to a greater extent in the form of better flood risk communication and management of flooding emergencies if the principles of Habermas's Theory of Communicative Action are applied to generate shared knowledge and establish processes or plans of action.

7.5 Summary

Interviews of six agencies, Scottish Environment Protection Agency (SEPA), Central Scotland Police (CSP), Lothian and Borders Police (LBP), Central Scotland Fire & Rescue Services (CSF&RS), Stirling Council (SC) and the City of Edinburgh Council (CEC), were carried out for the research to understand their flood risk awareness raising and warning efforts. These interviews provided useful insights into the understanding of flood risk awareness and warning related responsibilities of these agencies and how they were fulfilling these responsibilities.

The analysis revealed that none of the agencies, except the Stirling Council, viewed that it was responsible, legally or otherwise, for flood risk communication (awareness and warning) to the communities living in areas identified to be at risk of flooding. However, since the interviews, a new act, The FRM(S) Act has been implemented in Scotland and under this Act it is now SEPA's responsibility to warn and inform the public of flood risk. Further, although SEPA was not of the view that they were legally responsible for flood risk communication, they were proactively carrying out flood risk awareness efforts. Further, they were providing flood warning services through their Floodline service.

It was also found that SEPA targeted larger communities whereas SC had invested some effort into identifying specific properties at risk of flooding. The flood awareness information provided by the agencies covered many useful topics but from the analyses of the data gathered from the communities their reach was found to be limited. In contrast to flood risk awareness communication, it was found that the flood warnings contained only 'general' information which was confirmed by SEPA as one of the shortcomings. The flood risk awareness and warning information provided to the communities was not tailored for specific groups of people. Although various media were stated to be used for communicating flood awareness and warning messages to the communities, no clear media policy or media strategy was specified by any of the agencies. However, some of the agencies mentioned that they had arrangements with the media to broadcast messages in an emergency. Only SEPA indicated that they evaluated their communication efforts by indirect means, which was found to be insufficient and it was not clear how far the feedback was used in improving their services. All the agencies interviewed for this study indicated that they were benefitting

from partnership working but also mentioned a need for better coordination as at times there were gaps and overlaps in their services. Crucially, none of the agencies had consulted the communities to improve the effectiveness of their efforts.

It is clear that the local councils relied on SEPA for flood risk awareness raising efforts while SEPA only employed a 'top-down' communication approach that was mainly centred on their Floodline services and had very little emphasis on raising flood risk awareness. SEPA was found to have limited reach in communicating with the communities at risk of flooding. Further, it was found that the content of SEPA's flood awareness and warning messages lacked relevance to the communities or the area. These were found to have resulted in dissatisfaction with flood risk communication in the communities and therefore the communities were seeking much more information from SEPA and the local councils. The information related mainly to content and timing of flood warnings, emergency action plan and help from the councils (see section 6.4.2).

Many of the agencies identified lack of resources as one of the reasons for their inability to provide an adequate service to the communities. All the agencies expressed a need to improve the way flood risk communication activities were carried out. This included better understanding of the scale and level of flood risk, identification of the communities at risk of flooding as well as the issuing of meaningful awareness and warning messages in order for them to be taken seriously by the public whilst being useful to other agencies working under the aegis of SCG. SEPA spelt out many future plans which were in line with the above.

The analysis presented in this chapter also found that, against the principles of Habermas's Theory of Communicative Action, the agencies did not benefit from the knowledge and experience held by the communities in order to develop shared knowledge and understanding as they did not consult the communities, create spaces for deliberation and fully consider social norms, values and beliefs. Similarly, the agencies also did not utilise the most suitable media for communicating on awareness (conveyance task) and warning (convergence task) with the communities, which can be decided by referring to media theories such as Media Synchronicity Theory (see section 3.4).

The next chapter re-evaluates the above findings against the findings from the analyses of data gathered from communities (presented in Chapter 5 and Chapter 6) as well as the literature on risk communication (Chapter 2 and Chapter 3) to derive conclusions and recommendations to fulfil the aim and objectives of the research (presented in section 1.9).

Chapter 8
Key Research Findings

8.1 Introduction

This chapter draws together the key research findings which are based on the analyses and inferential observations presented in the previous chapters. Findings presented in Chapter 5 and Chapter 6 are relevant to assessing the 'emic' perspective (of communities) while those presented in Chapter 7 are relevant to assessing the 'etic' perspective (of agencies) of flood risk.

Of these, Chapter 5 presented an exploratory analysis of postal survey data whereas Chapter 6 presented qualitative analysis of one-to-one-interviews and focus group discussions. As stated in section 4.2.4, data produced through applying different methods can be compared in order to confirm or disconfirm each other's results (Barbour 2008) by applying a data analysis technique called 'triangulation'. Triangulation is also applied in order to enhance the validity of the findings (Blaikie 1991 cited in Fielding and Fielding 2008), increase the scope and depth of understanding (Fielding and Fielding 1986, Denzin and Lincoln 2000, and Fielding and Schreier 2001 cited in Fielding and Fielding 2008) and to dovetail different aspects of an investigation. Therefore, it has been argued that triangulation ensures the *validity* of the findings and hence the *rigour* of the research (Fielding and Fielding 2008). This chapter 'triangulates' these research findings on 'emic' perspectives and further compares and contrasts them with the findings on 'etic' perspectives derived from the qualitative analysis of the interviews of the agencies presented in Chapter 7.

The chapter is arranged in four sections including this section. The next section, section 8.2, presents the research findings related to emic perspective of flood risk after performing triangulation analysis whereas the subsequent section, section 8.3 compares and contrasts them with the findings related to the etic perspective of flood risk in order to generate research findings and conclusions. Finally, section 8.4 summarises the chapter and the key research findings and conclusions.

8.2 Findings related to 'emic' perspective of flood risk

The findings presented in the following subsections reflect the perspective on flood risk of the researched communities, the emic perspective, which is attributed to their knowledge and experience of flood risk. Emic perspective is also linked to Giddens's Theory of Reflexive Modernity and Beck's Theory of Risk Society, which essentially propose that risk is a social construct and that risk perceptions are subject to social rationality – according Habermas which is society's capacity to validate or accept a statement, claim or proposition – and to the characteristics of the individuals and those of the society. As stated in section 1.5, the emic perspective influences behaviour and expectations of the communities, and thus the adaptive governance of flood risk management, termed SFRM in Scotland.

8.2.1 Demographic composition of the research participants

Prior to presenting the findings and conclusions related to the emic perspectives of flood risk, it would be useful to understand the findings from the analysis of the demographic data because a number of factors are known to affect the process of risk communication such as age, gender (Lindell & Whitney 2000; Heller et al. 2005), marital status (Dooley et al. 1992; Russell et al. 1995), presence of children living at home (Dooley et al. 1992; Russell et al. 1995), income (Russell et al. 1995), education (Russell et al. 1995), home ownership (Russell et al. 1995; Mulilis et al. 2000) length of residence at the same location (Dooley et al. 1992; Russell et al. 1995; Tunstall et al. 1994; Fielding et al. 2002 cited in Tapsell & Tunstall 2008), previous disaster experience (Thieken et al. 2006; Zaleskiewicz et al. 2002; Heller et al. 2005; Tunstall et al. 1994; Fielding et al. 2002 cited in Tapsell & Tunstall 2008), personality characteristics (Heller et al. 2005), self-efficacy (Mulilis & Lippa 1990), perceived responsibility for preparedness (Mulilis et al. 2000; Lindell & Whitney 2000) and amount of concern or preoccupation for a future catastrophe (Dooley et al. 1992; Weinstein et al. 2000).

This research collected demographic data on some of the factors enlisted above. The analysis of these data, especially related to demonstrating the need for flood risk communication, is presented below. The analysis of the demographic data of the survey respondents as well as the one-to-one interviewees and focus group participants found that at 77% in the case of postal questionnaire respondents and 85.5% in the case of focus group participants and interviewees, the property ownership in the flood risk areas

was higher than the Scottish average of 65.5%. Further, at 38.5% in the case of questionnaire respondents and 59.4% in the case of focus group participants and interviewees, a significant proportion of the questionnaire respondents and focus group participants had experienced flooding in the past. The average length of stay of the research participants was about 14 to 15 years. However, contrary to expectations, it was found that these higher rates of house ownership, earlier flood experience and length of stay did not result in proportionately high rates of people who had taken action by installing flood-proofing products or modifications to properties to limit the impact of flooding.

These findings in themselves are insufficient to explain the reasons behind inaction by the communities and therefore it demands attention to other factors which may explain their behaviour. These findings related to 'emic' perspective are further discussed in the following subsections.

8.2.2 Knowledge about flood risk

The domain of 'knowledge about flooding', which contributed to defining the emic perspective, of the communities was explored by collecting data on topics related to perceived level of flood risk in their area; perceptions of the likely causes and sources of flooding; understanding of likely effects of floods on their properties, possessions, health and lives; their knowledge about preventive measures to reduce the impact of flooding; whether they had a plan for action in an event of flooding; and the actions they expected from key agencies. The findings are presented below.

On the level of flood risk to their areas, the quantitative analysis of postal survey data found that majority of the respondents (74.1%) thought that the level of risk of flooding in their areas was medium or high while a significant minority (11.5%) indicated it to be low. Thus, the evidence indicates that while the majority of the community members were aware that their areas could be at risk of flooding, there was a need to raise awareness of possible flooding amongst the remainder. The analysis of the qualitative data also provided similar findings and indicated variations in the level of perceived risk within and across communities, adding to the findings of the quantitative analysis. Also, since the communities for the research were selected based on information

published by SEPA, the analyses also confirm that SEPA correctly identified the areas which are likely to be at risk of flooding.

In contrast, quantitative analysis of the multiple choice responses provided on possible causes and sources of flooding indicated that majority of the respondents perceived high river water levels (87.6%), overloading of drains (48.3%) and blocked drains (34.5%) to be the most likely sources of flooding. Only a small minority (5.7%) of respondents indicated 'other' causes and sources, like mismanagement of reservoirs in the upstream and poor maintenance of the drains. The qualitative analysis also led to a similar list of causes and sources. However, contrary to the findings of the quantitative analysis, the qualitative analysis of focus group discussions suggested mismanagement of water as the major cause and source of flooding, followed by lack of maintenance of the river channel, poorly maintained and inadequate drainage systems and changes in the upper catchments. These findings were surprising but not unexpected because it is well known that focus groups are useful when it comes to investigating why participants think as they do and that they have the capacity to reflect issues and concerns salient to participants rather than closely following the researcher's agenda. This means that the resulting data can yield surprises (Barbour 2008). This was certainly the case with these findings. The location of the meetings in areas close to homes of the participants may also have encouraged them to focus on local issues relating to flood risk management. In summary, it was found that majority of the members of the communities were aware of the sources and causes of floods, effects of floods and how flood risk could be managed. Although the cited sources and causes of flood risk excluded some sources and causes such as groundwater flooding and flooding due to snowmelt, the communities might not have experienced these types of sources and causes, or the communities might have thought these to be irrelevant for them or not be aware of these. Thus, these findings highlight the importance of engaging with the communities and demonstrate that the etic perspective of flood risk does not always correspond with the emic perspective of flood risk on this aspect.

Regarding the effects of flooding, since only a limited list of effects of flooding was provided in the postal survey questionnaire, the responses were limited to those options which were: damage to their house (54.8%), loss or damage to furnishings and internal appliances (49.7%), damage to non-replaceable sentimental items (35.9%) and physical

or mental stress (36.0%). A small percentage (8.8%) of the respondents indicated not knowing about the likely effects of a flood event in their area. Further, 18.6% of the respondents indicated 'Other' effects where they mostly indicated that they lived on the upper floors and therefore were less likely to be affected directly. Therefore, it can be recommended that flood risk communicators should not assume that the public is aware of the consequences of flooding and be complacent in raising awareness on this issue. The qualitative data analysis generated similar findings. In addition, it also revealed further effects of flooding, for example difficulties in getting home insurance which covered damage due to flooding, reduction in property values and the added vulnerability of children, and elderly and disabled people. The qualitative analysis in this case supported the quantitative method and also generated additional information that reflected the concerns of residents of flood prone areas. Although flood risk communication may not be able to alleviate the issue of obtaining flood risk insurance for homes and effects on property values directly, a more detailed flood risk assessment would certainly be helpful in clearly identifying properties for improving their resilience to floods and warning their occupants. The communities also confirmed that elderly, children and disabled people were the ones who may be considered as vulnerable to floods. This finding can be used to make sure that the properties with such occupants are well informed and are warned of flood risk after holding a dialogue with them to understand their specific issues and concerns.

On measures to limit the impact of flooding, the quantitative analysis explored the percentage of respondents who had taken action to limit the impact of flooding on their families and found that it was low (23.6%). Further, majority of respondents (71.3%) indicated that they did not have a plan for action. However, the qualitative analysis suggested that, in general, the knowledge the participants had about protecting their properties and lives was adequate. It further provided insights into the reasons why people were not taking any protective action. It found that people were of the opinion that at an individual level they were unable to do much and therefore they expected action from others, for example from the local authorities. The qualitative analysis, thus, corroborated the findings of the quantitative analysis on this topic too by providing further information and explanation relating to lack of action on the part of communities living in flood prone areas. This finding means that merely making the communities aware of flood risk and warning them was not enough for expecting that the

communities would act to protect themselves. It is necessary that further inroads into ensuring how best the communities can protect themselves are made through a dialogue with the communities. In such a dialogue the communities would present their views and concerns about risk of flooding to their specific communities as well as information requirements to the 'experts' and efforts would be made to reach an agreement with the communities on how best the risk of flooding can be managed. The findings presented in this section are compared further with the findings from the analysis of data of interviews of the agencies and are discussed in section 8.3.3 while discussing findings from the analysis of data collected from the agencies.

8.2.3 Flood risk information sources, topics and levels of satisfaction

This section presents the triangulation analysis of the quantitative and qualitative data to identify the sources of flood awareness and warning information of the communities. The exercise further explored their level of satisfaction on the information they had received as well as what further information they sought to raise their awareness about flooding related topics and warnings. The findings are presented below.

Regarding the sources of information on flood risk, the quantitative analysis found that weather forecasts on TV (53.9%) and on radio (32.5%), news on TV, radio and in newspapers (35.8%) together with interpersonal communication involving neighbours, local residents, friends and relatives (42.2%) and local public meetings and exhibitions (31.6%) were the main sources of flood risk information of the participants. Surprisingly, SEPA was identified as the source of flood risk related information by less than 15% respondents. On the source of flood warning, the quantitative analysis indicated that only less than a third of respondents (28.6%) indicated that they received any flood warning; out of these about a fifth of the respondents mentioned that they had obtained flood warnings from SEPA. Thus only about 6% respondents indicated that SEPA was the source of flood warnings for them. The others (44.2% of 28.6%) indicated that their sources of flood warning were police, fire & rescue service, e-mail at work, housing association and neighbours. The qualitative analysis confirmed that participants were poorly informed about possible flooding and that they had acquired their knowledge mainly through their own observations and interactions with other residents. Although some were aware of other information sources, including SEPA's Floodline and local council newsletters, many did not use those information sources due

to perceived lack of reliability and relevance, for example many thought that Floodline was providing flood warnings for England only.

On further information sought to raise awareness about flooding, the quantitative data suggested that the topics of interest were mainly to do with an imminent flood incident (information for dealing with a flood emergency situation). In a similar vein, the qualitative analysis revealed three main topics on which the participants expected more information: flood warnings, information relevant to flooding emergencies and information relevant to flood risk alleviation schemes in their areas.

The participants expressed many expectations related to flood warnings. In particular, they thought that they should receive a flood warning well in advance so that they can take preventive and protective measures. The messages should be relevant to their area, as accurate as possible and these should also contain vital information such as some measure of severity and other relevant information like expected rainfall and tide times so that they can ascertain its significance and decide if they should take any relevant action. The message should also contain a phone number to call for assistance or for further information. They also had thoughts on some innovative formats through which the message could be delivered, for example, local sign boards near the rivers or flood level marks on local bridges.

On flooding emergencies, the public viewed the local councils as their flood protection authorities and expected flood risk communication from them. They wanted to know what the flooding emergency action plan was, how their local council intended to help them and what the emergency procedures were, what the 'Community Risk Register' meant for them, the particulars of the centres where they could take refuge in their areas should they need to evacuate in an emergency, whether any medical care was going to be available and what they could take with them in such a situation. They also wanted more information on flood-proofing products and whether they needed planning permission to install them.

On information related to flood alleviation schemes, they expected more information on the implementation timelines, the financial details relating to the schemes and most importantly, the role which flood alleviation schemes would play in reducing the level

of flood risk in their area. Further, it was observed that they had lost trust in the local councils, for example many complained that they did not get any sandbags and they were not listened to.

Further, it was found that a 'sense of community' was prevalent in the communities living in areas identified to be at risk of flooding and that it helped in spreading flooding news wider and faster in certain communities, for example, in Callander. Further, smaller community sizes and cohesiveness also appeared to be linked to better understanding and acceptance of flood risk, for example in Riverside in Stirling compared to study sites in Edinburgh.

Section 3.2 elaborates the relevance of factors such as prior knowledge and availability of information, socio-demographics of communities, prevalence of sense of community, relevance of place and culture, essential characteristics of risk communication messages and role of trust for the flood risk communication process. On comparing these with the findings of the analysis presented above, it was found that SEPA, as the source of flood risk communication for both flood risk awareness and flood warnings, had a limited reach amongst the communities. The communities also expected information from other sources such as the local councils. It was found that the topics on flood risk information needed refinement including making the information relevant to the expectations of the communities, presenting the information in the formats which communities expected and tailoring the information to ensure greater reach to all the socio-demographically diverse groups. In addition, the information was also found to be inadequate in ensuring that the community expectations and goals of flood risk communication were met. As such it was found that the communities were dissatisfied with the flood risk communication. This was found to affect their trust in the agencies and the credibility of the agencies, particularly of SEPA and the local councils. Congruent with the literature on the role of sense of community, place and culture, the analysis found that these affected flood risk perception, acceptability and communication within communities. To summarise, it was found that the etic efforts of the agencies and the emic expectations of the communities revealed differences in relation to flood risk information sources, topics for communication and levels of satisfaction which severely impaired the flood risk communication process.

In summary, it can be observed that substantial improvements to flood risk communication strategies were required and therefore it can be recommended that increased dialogue with the communities at risk of flooding should be established to ensure that trust in the communicators is built up and to ensure that these issues are addressed. These findings and conclusions are in agreement of the recommendations by Habermas where his Theory of Communicative Action proposes dialogue with the stakeholders – communicative action - to reach agreements. This also relates to Beck's Theory of Risk Society where Beck elaborates on the issue of trust and also with Giddens's Theory of Reflexive Modernity which advocates the role of social rationality in influencing the emic perspectives.

Further, it can be observed that compared to the quantitative method the qualitative method generated a wealth of detailed information thus reinforcing the benefits of triangulation. These findings are compared further with the findings from the analysis of interviews with agencies and are discussed in section 8.3.3.

8.2.4 Media preferred by communities

The role of media and the usefulness of selecting appropriate media for risk communication has been emphasised in sections 3.3 and 3.4. Media Synchronicity Theory was also selected to assess its suitability for informing media selection for flood risk communication with the communities. This section presents the triangulation analysis of the quantitative and qualitative data collected to identify media issues such as availability, cost, intrusion into privacy and technical or personal difficulty in using certain media, specifically when these media are used for flood risk communication purposes. This section also presents findings on the media preferred by the communities for flood risk awareness and flood risk warnings.

Except for the question related to the media used on a day-to-day basis, the quantitative exercise did not gather as much data as was gathered by responses to other questions. However, this gap in data availability was filled by the rich data generated by the qualitative research exercise. Thus, the triangulation of these datasets was useful in ensuring that enough data was available for this element of the research. The triangulation exercise found that the participants did not consider media availability, cost and intrusion into privacy as significant issues in the context of flood risk

communication. However, it is noteworthy that they were concerned about their contact details being passed onto other agencies. The quantitative data analysis had suggested that some respondents, mainly those over the age of 60 years, experienced technical or personal difficulties in using certain media, thus supporting the finding of the quantitative analysis.

On the preferred media for flood risk awareness, the quantitative analysis found that TV, brochures or leaflets and radio were the preferred media. However, qualitative analysis found that in addition to the above media, the internet and exhibitions too were preferred by the participants for flood risk awareness. In relation to flood warnings, analysis of the quantitative data found that TV, radio, phone calls and visit to property were the preferred media. The qualitative analysis, in addition, found that mobile phone text messages and public announcements using a loudspeaker or siren, too, were amongst the preferred media for flood warnings.

The analysis further found that the sources of information the communities indicated they received flood related information from as well as the media they indicated that they used on a day-to-day basis were different from the media they preferred for flood risk awareness and warning. For example, people who indicated the newspaper as the media used on a day-to-day basis indicated a preference for flood awareness messages through brochures and warning messages through radio. Further, some of the media mentioned above which some members of the communities indicated as posing privacy concerns or personal or technical difficulties were also the media some other members of the communities indicated as their preferred media for flood risk awareness and warning. For example, a few people had concerns about a visit to their property due to privacy concerns but others welcomed this.

Thus, in both the above cases, the triangulation analysis suggests that the qualitative analysis, in addition to validating the findings of the quantitative analysis, also provided additional findings. The analysis, in particular, highlights three main findings related to media selection for flood risk communication on the part of communities in flood risk areas: first, that certain media tend to be preferred depending on the purpose of the communication task - awareness or warning; second, that the preferences for those media vary so widely that in order to achieve greater reach of flood risk communication,

a wide variety of media needs to be used and third that, some vulnerable groups of people, for example, those with physical disabilities have specific needs – not just preferences – which need to be taken into account while designing and implementing a flood risk communication strategy.

In summary, the analysis found that to ensure greater reach of the flood risk communication, a variety of media need to be employed and that using only a limited media for flood risk communication may result in possible exclusion of some groups of people. The analysis also found that the reach of flood risk communication can be improved if the communication can be targeted by identifying the media preferred by the communities. It also found that the preferred media varied depending on the task of risk communication – awareness or warning. The findings from this analysis are further discussed in section 8.3.5 which discusses the media used by the relevant agencies for flood risk communication and in section 9.5.2 which discusses the implications of the findings for Media Synchronicity Theory.

8.3 Findings related to 'etic' perspective of flood risk

As stated in section 1.5, etic perspective, attributed to the risk communicators and emergency response agencies, influences policies and government responses, and thus the adaptive governance of flood risk management, termed SFRM in Scotland. According to the Theory of Communicative Action proposed by Habermas, the etic and emic perspectives can be converged through 'communicative action' where the stakeholders come together to generate new shared knowledge that is based upon the knowledge and experience of the individual stakeholders. As stated in section 1.5, convergence of etic and emic perspectives is required for successful communication on risks. The findings related to emic perspectives are compared and contrasted in the following subsections while presenting the etic perspectives of flood risk.

8.3.1 Responsibility to inform and warn of flood risk

Review of the actors for flood risk communication in Scotland (see section 2.3) revealed that the Civil Contingencies Act 2004 identifies SEPA, the local authorities and the emergency services to be responsible for flood risk communication (awareness and warning) to the communities living in areas identified to be at risk of flooding. However, none of the agencies interviewed for this research (SEPA, City of Edinburgh

Council, Stirling Council, Lothian & Borders Police, Central Scotland Police and Central Scotland Fire & Rescue Service), except the Stirling Council, viewed that it was legally responsible for doing so. Further to the analysis of flood risk communication practice in Scotland (see section 2.5.1), it was stated by all the agencies (see sections 7.2.1 to 7.2.5 and 7.3.1 to 7.3.5) that raising flood risk awareness and issuing flood warnings was the responsibility of SEPA under the joint working arrangements through Strategic Coordination Group (SCG) in Scotland. However, the analysis of the data gathered from the communities (see section 8.2.3) found that the public viewed the local councils as their flood protection agencies and expected communication from them as well but had little awareness of the role of SEPA and emergency services. This finding was not anticipated before gathering data from the communities as SEPA was thought to be widely recognised as 'the flood warning authority' in Scotland and was also proactively carrying out flood awareness efforts (see section 2.5.1). Unless communities are aware of the flood risk information and warning sources, it is unlikely that the information which the agencies would wish to communicate would reach them. This, thus, shows a clear gap in flood risk communication which can be addressed by carrying out increased awareness efforts to make the communities aware of the flood risk information and warning sources, particularly the role of SEPA, local authorities and emergency services.

Related to this it is worth reiterating that, since the interviews, a new act, the FRM(S) Act, has been implemented in Scotland and under Part 5 of the Act (C. C. Secretariat 2009) SEPA is given exclusive responsibility for flood warning in Scotland. The ministerial guidance document complementing the FRM(S) Act states that the responsible authorities, in liaison with the Scottish Government, the Scottish Flood Forum and other relevant organisations, are expected to further develop and begin implementation of an improved national engagement and communication strategy. However, section 2.5.1 discussed and demonstrated how the flood risk communication efforts in Scotland, particularly the flood risk awareness raising efforts, even after implementation of the FRM(S) Act were oriented towards 'educating' the at risk communities. This approach is similar to the argument by Stickler et al. (2011) where they contend that scientists, technicians and persons from administration often still tend to see stakeholder participation as a tool to educate the stakeholders/the public so that these eventually understand the value and necessity of the actions proposed by the

scientists/the administration and therefore they warn of losing trust. Therefore it can be recommended that beyond restructuring or developing flood risk communication strategies, the scope of the FRM(S) Act should be extended to include a requirement to hold dialogue with the communities by acknowledging them as a legitimate partner in decision making. This is suggested to be enacted by placing a duty to do so on SEPA, local authorities, Scottish Flood Forum and relevant organisations identified by the FRM(S) Act. This will ensure that these agencies remain proactive in raising flood risk awareness to help enhance community preparedness against flooding and such efforts would ensure that the issued flood warnings are effective.

The above findings also highlight issues which are relevant to adaptive governance of flood risk discussed in section 1.2 or to implementing sustainable flood risk management initiatives and thus to flood risk communication strategies, particularly in relation to the roles and responsibilities of agencies and individuals. Previous studies have highlighted that perceived responsibility for preparedness is known to affect flood risk communication (Mulilis et al. 2000; Lindell & Whitney 2000). Therefore, the authorities responsible for flood risk communication and protection from floods need to think of bridging these gaps in understanding through better communication and enabling protection from floods in the most effective manner. The former could be achieved by developing enhanced flood risk communication strategies by the agencies to provide appropriate and timely advice to the communities, by making them aware of the actions being taken and by clarifying the roles and responsibilities of the agencies as well as the individual members of the communities. The latter could be achieved through efforts such as supporting the communities financially, allocating more funds for clearing up of waterways and implementing flood protection schemes as necessary, working together with reservoir managers and reviewing development planning to ensure reduction of flood risk downstream if a new development is approved in the catchment and lastly by improving management of floodwaters. Since under the Reservoirs Act (2011) SEPA is now poised to take control from local authorities of reservoirs in Scotland, it is anticipated that this will lead to better management due to the potential for reducing gaps in coordination.

8.3.2 Identifying localities for flood risk communication

SEPA published the Indicative River & Coastal Flood Map (Scotland) in 2006, also referred to as SEPA Flood Maps, to identify areas at risk of flooding. The information accompanying the maps states that the purpose of the maps is to facilitate and inform development planning control while SEPA and other agencies emphasised its usefulness as a flood risk awareness tool. However, these maps did not seem to be effectively used by SEPA for targeting flood risk communication efforts. Instead it was found that SEPA targeted wider communities for raising flood risk awareness arguing that flood risk affects all. In contrast, Stirling Council had invested some effort into identifying specific properties at risk of flooding based on SEPA Flood Maps and historical flood information for flood awareness and emergency assistance. The City of Edinburgh Council reported that they did not carry out flood risk awareness activities although some relevant information was made available by them and they used SEPA Flood Map to identify localities where flood protection works may be beneficial, not for flood risk awareness or warning. The emergency services (CSP, LBP and CSF&RS) reported that they were well aware of their command areas and together with the information received from Met Office; they were able to identify potentially vulnerable areas in advance of flood incidents. It is noteworthy that SEPA also stated that identification of areas for issuing flood warnings was based on Met Office forecasts. This highlights the dependence on a single source of information for issuing flood warnings but also the lack of technical capabilities of SEPA in issuing better informed warnings. As stated earlier, SEPA's warnings were mainly passive in nature.

Therefore, although it can be said that SEPA, local councils and the emergency services have adequate knowledge of the localities which may be at risk of flooding, the above findings highlight the limited usefulness of such information in absence of a well devised approach which includes considerations of additional factors from the emic perspective such as inclusion of all possible causes and sources of flooding together with their likely severity, demographics of the target communities, expected socio-economic impact of flooding incidences and further developing of SEPA's capabilities towards assessing locality specific flood risk to ensure that the flood risk communication is not a general but locality and event specific. It also highlights the lack of attention to the knowledge and experience held by the communities and the lack

of stakeholder engagement by the agencies in contrast to the principles of Habermas's Theory of Communicative Action.

8.3.3 Topics for flood risk communication

The flood risk communication literature (Molinari & Handmer 2011; Hansson et al. 2008; Bouder 2009; Burningham et al. 2008; McCarthy 2004 cited in Faulkner et al. 2010; Schelfaut et al. 2011) suggests that flood risk awareness is very important for flood warnings to be effective. On this and as detailed in section 7.2.3, it was found that SEPA's efforts were mainly concentrated on promoting Floodline and SEPA Flood Map although they also provided information on various other topics such as advice and guidance relating to what people can do to prepare for flooding, for example, preparing 'flood kits'; taking insurance to protect against flooding; having a family flood plan and raising awareness of roles and responsibilities related to flooding and flood-proofing products. City of Edinburgh Council's topics for information were mostly related to the flood prevention schemes which the local council was promoting but in addition they also provided information on what people could do in the event of flooding. The Stirling Council provided information to the public on various topics related to floods, such as protective actions before flood occurrence and advising them that they were living in an area prone to flooding.

From the above analysis, the information provided might appear to be comprehensive. However, the topics did not cover some of the topics on which the communities sought information (see section 8.2.3), for example, community-wide emergency action plans, Community Risk Register, emergency refuge centres or contact details during a flood emergency, flood protection products, etc. It also shows the differences in the type of information the agencies disseminated, including differences in the information which the two local authorities disseminated.

The agencies, particularly the local authorities, stated that flood action plans were available. However, the public were unaware of any flood action plans. Further, the plans were sketchy and did not inform the public what was expected from them when flood related information or warning messages were communicated to them. Councils had designated flood emergency shelters but the public did not know about these. The local councils expected the public to contact them for this type of information.

Nevertheless, they also admitted that not all information was available on their websites and they also encountered staffing issues related to providing telephonic support, particularly during out of hours, thus pointing to the influence of institutional factors as argued by Social Amplification of Risk Framework (SARF).

On the topics for flood risk warning, the police, as the lead agency of SCG, were providing information related to traffic and road closure to media, such as radio and TV. They also provided information to people in an emergency by directly contacting the people and asking them to put up defences, informing them where they can get sandbags and providing contact numbers for help. The local councils also claimed that they provided such information but acknowledged staff shortages. However, no such information was actively disseminated by SEPA or fire & rescue services. In fact, SEPA acknowledged that the flood warnings issued were 'general', for a large area and not specific to particular areas which were at risk of flooding. In contrast, the public sought specific information, such as some measure of severity, which areas would be affected and other relevant information like expected rainfall and tide times.

The literature suggests that for an effective risk response prior knowledge of the risk is vital (Hurnen & McClure 1997) and that there should be no knowledge gaps (Siegrist & Gutscher 2006). The literature also warns against vague or incomplete warning messages (Perry & Lindell 2003) and advocates crystal clear messages (D'Aprix 2005) which contain information which people can use to predict the likely consequences (Gigerenzer et al. 2005). It also cautions against 'mixed messages' (Jardine & Hrudey 1997) and too many buzzwords or jargon (Khodarahmi 2006).

Therefore, for flood risk communication efforts to be meaningful to the public and to be effective, the range of topics on flood awareness and warning needs to be extended to cover the topics which the communities expect and view as relevant to them. If the flood warnings are only 'general' in nature, these obviously would not be of much help unless area specific information and some assessment of likely consequences are provided to the communities. Therefore, it is no wonder that the communities relied on self-observation of rivers. As suggested by above referred literature, the warnings would not be effective if the public is not aware of the implications of the warnings and does not know what to do after receiving a warning. This finding also has implications

beyond framing a flood risk communication strategy, for example, for issuing information on measure of severity relevant to particular areas, SEPA may need to improve their flood prediction models and systems, install new equipment such as rain- and river- gauges and recruit specialist staff. They may also need to improve coordination with other agencies such as the Met Office to obtain rainfall and tide data and with the emergency services to inform their assessment of flood risk for specific areas. This is congruent with the literature which advocates that communicators need to equip themselves with knowledge and skills in reporting the issues to the public (Fleming et al. 2006) and to view the risk from the eyes of the risk perceiver (Lion et al. 2002), in this case, those most likely to be affected, and the agencies which are responsible for supporting them.

The improvements need to be on three fronts: firstly, the information topics need to be made directly relevant to the residents of flood risk areas, secondly, the information should be reliable and thirdly, the sources of information need to be well publicised. To ensure these improvements, the agencies responsible for flood risk communication will need to work harder to identify and communicate information which would be seen by 'at risk' communities to be relevant and reliable. Stakeholder engagement and communicative action as proposed by Habermas's Theory of Communicative Action is most likely to help in identifying the relevant information topics and defining their content in agreement with the target audience. This finding may also have further significance as the agencies also need to identify if they are in a position to provide such information, and if not, whether they need to undertake initiatives which will enable them to generate such information. This may include review of the procedures and available resources for generating such information.

8.3.4 Information tailoring for specific groups of people

Section 8.2.1 reiterates the importance of socio-demographic factors in influencing risk communication and the importance of tailoring risk communication to ensure that it does not exclude specific groups of people. However, the analysis of the interviews with the agencies revealed that although some tailoring of information was carried out by SEPA, for example for young people through plays organised in schools and for businesses through business specific events (the researcher is aware of only one such event in the previous 5 years), the flood risk awareness and warning information

provided to the communities in general were not tailored for any specific groups of people. Similarly it was found that The City of Edinburgh Council (CEC) provided information tailored for people who were likely to be affected and protected by flood prevention schemes only. It expressed its inability to identify and communicate with vulnerable people or people with special needs because latest or up to date information was not shared by health services, indicating potential limitations to information tailoring. Similarly, Stirling Council stated that rather than tailoring the information for specific groups of people, it tried to convey that information to all the people in those areas.

From the above findings, it is clear that only some of the information was tailored for specific groups. Further, such tailoring did not take account of age groups, language groups, people with physical disability or facing technical difficulties in using particular media, and did not distinguish between tenants and house owners. Although it may be difficult to consider all the factors reported in the literature and formulate a group-specific communication strategy, this analysis nevertheless provides an indication of the importance of tailored information for flood risk communication. To summarise, it can be argued that to be effective, flood risk communication strategies need to ensure a wide reach and that tailoring information for various groups would facilitate this task. Dialogue with the communities, as suggested by Habermas's Theory of Communicative Action, would help in identifying specific groups in the communities together with their information needs. This information will help in developing and delivering tailored communication for these groups.

8.3.5 Media used for flood risk communication

This section presents the analysis related to the media used by the agencies for flood risk communication and compares them with the preferred media indicated by the communities. Various media, which included leaflets, local newspapers, community newspapers or magazines, local council newsletters or magazines, radio, TV, DVD, face-to-face meetings and some promotional stationery, were reported to be used by SEPA for communicating flood awareness messages to the communities. The local councils disseminated the information mainly through letters, local council newsletters or magazines and sometimes posted the information on their websites. However, no clear communication strategy was specified by any of the agencies. As discussed in

section 8.2.4, the preferred media for flood risk awareness indicated by the survey respondents and qualitative study participants were TV, brochures or leaflets, radio, the internet and exhibitions. This suggests that the agencies need to consider additional media for flood risk awareness.

On dissemination of flood warnings, the police mentioned that they had arrangements with the media to broadcast messages. As identified in the previous section, communities were also contacted directly in case of imminent flooding situations which involved door-to-door knocking and dropping leaflets containing contact numbers for further information and assistance. The views of the two police agencies, LBP and CSP, differed on the use of sirens or loudhailers for warning people. While the LBP were using these, CSP indicated otherwise, stating that it may potentially cause panic whereas as mentioned in section 8.2.4 communities supported these. Although local councils only occasionally provided flood warnings to the people, SC stated that they had arrangements with the local radio station. SEPA's warnings were communicated through the Floodline service through their website and phone but they also claimed to have robust arrangements with the media. This research indicated that TV, radio, phone calls, visit to property, mobile phone text messages and public announcements using a loudspeaker or siren were the media preferred by the communities for flood warnings. This finding also, as in case of the media for flood awareness purpose, suggests that the agencies need to consider additional media for flood risk warning.

However, analysis of data from the communities indicates that much of the above claimed information does not seem to have reached them. The qualitative analysis confirmed that participants were poorly informed about possible flooding and that they had acquired their knowledge mainly through their own observations and interactions with other residents, again providing evidence of the importance of social factors. The analysis suggests that this is mainly due to three reasons: firstly, that the communities are not aware that such information exists, secondly, that they expect this information from local councils and thirdly, that the information seems to be put on only the websites without any promotion of its existence. It was found that only the Floodline service was promoted, and therefore, the information was available only to the people who actively sought the information. These findings highlight the importance of social factors in evaluating flood risk communication.

Previous research indicates that risk communication channels play a significant role during emergencies (Maxwell 2003) and influence the risk perceptions of others (Flynn et al. 2001). Furthermore, it is suggested that since the public use of media varies from entertainment, leisure and relaxation to obtaining news and warnings (Severin & Tankard 1992), risk communication managers and professionals are obliged to choose those media that are most appropriate to the audience's needs (D'Aprix 2005). The findings presented in section 8.2.4 also indicate that flood risk communication strategies should include a wide variety of media to avoid exclusion of people, including those who may have technical or personal difficulties in using certain media. Therefore, for effective flood risk communication, it is vital that in addition to making the public aware of the source of the information, the information is disseminated actively by employing media judiciously and more importantly by establishing a clear communication strategy. The findings presented in section 8.2.4 provide valuable information on the various aspects which should be considered while choosing media for flood risk awareness and warning purposes.

Similar to flood risk awareness sources, the majority of the respondents indicated that their sources of flood warning were the police, fire services, e-mail at work, their housing associations and neighbours. Thus, it was found that the valuable information of specific localities likely to be at risk of flooding that is held by SEPA, local councils and emergency services is not being used effectively by the agencies to raise awareness of flood risk or to warn the public of flood risk. This also reinforces the influence, as argued by SARF, of institutional factors on flood risk communication. It also means that communication exercises need to be sensitive to purpose, varied and proactive (transmitting information and reaching communities actively), rather than relying on people to make efforts to find the sources and media through which flood risk information is available. Further analysis on the choice of media for flood risk communication is presented in light of Media Synchronicity theory in section 9.5.2.

8.3.6 Evaluation of flood risk communication efforts

Only SEPA indicated that they evaluated their communication efforts by indirect means, by recording the number of calls and web-hits to their Floodline service, but it was not clear how far the feedback was used in improving their services. The local councils and the emergency services did not evaluate their communication efforts

although SC evaluated their communication efforts in general which were not specifically targeted at evaluating flood risk communication efforts. However, with reference to the literature presented in section 3.5, it can be argued that it is vital that the agencies evaluate their flood risk communication efforts otherwise they would not be in a position to meet the expectations of the target audience in terms of flood risk awareness and warning information they require or make appropriate improvements to their own risk communication services. Unless such an exercise is undertaken routinely, any gaps between the etic perspective of the agencies and emic perspective of the communities would be difficult to establish and address. This aspect, thus, has important implications for establishing trust and credibility which are at the heart of Beck's Theory of Risk Society and Giddens's Theory of Reflexive Modernity as they relate to 'social rationality'. As stated in section 1.5, social rationality is a characteristic of Habermas's Theory of Communicative Action and is known to affect the process of flood risk communication.

8.3.7 Roles and responsibilities of key agencies

The roles and responsibilities and any relevant gaps and overlaps of the key agencies for flood risk communication have been analysed in detail in section 7.2.7, 7.3.7 and 7.4. It was found that the agencies were working under the aegis of Strategic Coordination Group (SCG), their responsibilities were fairly well delineated and also that they were working in coordination with each other. All the agencies interviewed for this study indicated that they were benefitting from this partnership-working arrangement under the aegis of SCG. But they also mentioned a need for better coordination as at times, they stated, there were gaps and overlaps in their services, such as SEPA issuing flood warnings based on forecast issued by Met Office whilst the other agencies too know of the forecast and possible flooding, too short notices for the councils to prepare the evacuation shelters for occupation. Any gaps and overlaps in their services may not only confuse people and prevent them contacting an appropriate agency for advice on effective protective and preventive actions but may also hamper their own coordinated efforts to safeguard public. This in turn could contribute to damage to property or even loss of life. More discussion on the cited gaps and overlaps is provided below.

It was found that pertaining to the nature of the services they had to render during a flooding emergency, some overlaps were inevitable but they did not have any concerns

as the SCG were coordinating to minimise the gaps and overlaps during emergencies. They, however, were concerned that there were gaps which needed to be addressed. Amongst these gaps as identified by this research was the lack of any community engagement initiatives for ensuring that views and needs of the communities, as the legitimate partners in flood risk communication, were taken into account. One of the gaps the agencies pointed out was lack of a community-wide flooding-specific emergency action plan. The agencies were also concerned that the warnings they received from SEPA were not good enough as they were overly general in nature and could not be made available to them in sufficient time for them to take appropriate actions such as organising resources. The next gap cited by the agencies was lack of clarification to the public on the roles and responsibilities of different agencies, specifically between SEPA and the local councils; for instance it needed to be made clear that SEPA only issues warnings but does not have any responsibility of planning emergency actions such as evacuation and the planning of flood defences.

It was also found that the agencies were experiencing particular difficulties in their ability to employ sufficient resources due to funding constraints and as a result they could only partially meet expectations related to raising awareness of flood risk, issuing warnings and providing help and support to the communities. However, there were other constraints which affected flood risk assessments and warning times too, such as improvements required in the rainfall and river level monitoring equipment which, in addition to funding, also required support from the local councils and availability of trained personnel and better coordination among themselves to share the resources and information they held. This was reported to have the potential to affect the effectiveness of the flood warnings disseminated through Floodline - if the warnings were too frequent but not relevant and accurate, the individuals living in flood risk areas may stop paying attention to these.

As mentioned earlier, flood risk communication is seen by key agencies to be the responsibility of SEPA. This is in stark contrast to the widespread perception among communities who perceived that such communication is the responsibility of the local authorities. Similarly, while the responsibility for warning people is perceived by agencies to be the responsibility of SEPA, analysis of data from the communities indicated that the main agency they had received flood warnings from was the police.

The communities perceived their local councils to be the flood prevention authorities and expected help and support from them as well as the Scottish Government. Very few people perceived themselves to be protecting their properties from flooding. They perceived flooding to be mainly the result of human actions and could be managed by managing the floodwaters better and taking preventive actions. They also believed that the majority of the residents were unable to take undertake preventive and protective measures at the individual level. They therefore believed that actions should be taken by others, mainly the local councils with help from Scottish Government and other relevant agencies. This analysis highlights the importance of clarifying the roles and responsibilities of the key agencies to the public as well as the importance of individual responsibility; and thus the role of both social and institutional factors in developing risk communication strategies.

8.3.8 Future plans for flood risk communication

It was found that many of the interviewed agencies stated lack of resources as one of the main reasons for their inability to provide adequate service to the communities (see sections 7.2.7, 7.3.7 and 8.3). Nevertheless, all the agencies recognised that there was a need to improve the way flood risk communication activities were carried out and had many plans for future. These future plans of the agencies are discussed in more detail in sections 7.2.8 and 7.3.8. This included better understanding of sources and causes of flood risk, identification of the communities at risk of flooding, issuing of meaningful awareness and warning messages in order to have them taken seriously by the people, better coordination amongst the agencies and crucially availability of funds. Of these 'issuing meaningful awareness and warning messages' to the communities would inevitably mean that the views and concerns of the communities, as argued by of Habermas's Theory of Communicative Action for the development of shared understanding, are taken into account while developing a flood risk communication strategy.

SEPA spelt out many future plans which were in line with the improvements to flood risk communication that at risk communities perceived were required. They indicated that the information content would cover more topics, and various media, including new media forms like 'Twitter' and 'Facebook', would be employed. The information would also be made more specific for the communities, such as which areas would be

affected by floods. Information would also be transmitted in various languages and also in formats to comply with the Disability Discrimination Act 1995 (DDA). SEPA were also about to expand their customer base by encouraging more people and businesses in flood risk areas to sign up for their Floodline service.

However, no mention of dialogue with the communities was made and it was mentioned that they were learning from published research and literature. This is one of the most serious limitations of their future communication plan which can be argued, to be following the 'top-down' communication approach only instead of, as advocated by Habermas's Theory of Communicative Action and literature on effective flood risk communication practices, being informed by community dialogue and establishment of trust.

It is noteworthy that the local authorities had no credible future flood risk communication plans of their own and contrary to expectations of the communities and provisions in the legislation, mainly the Civil Contingencies Act, were mainly reliant on SEPA for both flood risk awareness and warning. Therefore, it was recommended earlier in section 8.3.1 that the local authorities, too, should disseminate flood risk awareness information to the communities and clarify their role and responsibilities. SEPA's future plans for improving flood risk awareness and reaching wider sections of the population seem to be moving in the right direction. However, as stated earlier the agencies did not evaluate their flood risk communication efforts or engage with the communities. Therefore, it is very likely that the community expectations and needs related to flood risk awareness and warning as discussed in the previous sections may not be incorporated in those plans. This research, thus, indicates that the agencies can ensure sustainable flood risk management by planning towards *ownership* of the job of flood risk communication. The policy implications of this research would, therefore, be of significant relevance and help agencies to review and refine their flood risk communication plans.

8.4 Summary

This chapter presented and discussed the key findings from the quantitative and qualitative data which was collected through postal survey, one-to-one interviews and focus group discussions of the members of the communities by subjecting them to

triangulation analysis. These were further compared and contrasted with the findings from the analysis of the qualitative data which was collected by interviewing the selected agencies relevant to flood risk communication.

The next chapter will discuss the implications of these findings for policies on flood risk communication. It will also present recommendations stemming from this research study.

Chapter 9
Conclusions, Theoretical Contributions and Policy Implications

9.1 Introduction

The research set out with the aim of identifying gaps in flood risk perspectives between 'communicating agencies' and 'communities at risk of flooding', and of examining the suitability of various media types for flood risk communication. The previous chapter, Chapter 8, discussed the key findings of the research. This chapter demonstrates how the aim and objectives of the research were fulfilled, summarises the main research findings, discusses their implications for flood risk communication policies and makes recommendations for key agencies. It also discusses the theoretical contribution of the thesis, appraises the research strategies and methods, presents limitations of the research and finally makes recommendations for future research.

The chapter is arranged in nine sections including this section. The next section, section 9.2, recapitulates the rationale, aim and objectives of the research before appraising how the research fulfilled these in the subsequent section, section 9.3. The next section, section 9.4, presents the conclusions of the research. The subsequent section, section 9.5, presents the theoretical contribution of the thesis in relation to the two selected theories, Habermas's Theory of Communicative Action and Media Synchronicity Theory. The research findings and conclusions are then analysed to generate the policy implications and recommendation to key agencies on improving flood risk communication. These are presented in section 9.6. Section 9.7 then appraises the research methodology employed for the research, section 9.8 presents limitations of the research and the final section, section 9.9 presents priority topics identified for future research.

9.2 Rationale aim and objectives of the research

The framework adopted for adaptive governance of flood risk management is termed as Sustainable Flood Risk Management (SFRM) in Scotland (Cashman 2007). Flood risk communication between institutions and communities features prominently as one of the tools of SFRM and is also advocated by literature, for example, Molinari & Handmer (2011), Hansson et al. (2008) Bouder (2009) and Schelfaut et al. (2011).

Flood risk communication is legislated in Scottish law through Flood Risk Management (Scotland) Act 2009. This is in addition to UK-wide similar legislation in the form of the Civil Contingencies Act 2004 which requires risk communication with communities on emergencies. This objective of fulfilling legal duties is among the many objectives of flood risk communication that are centred on an agency as the communicator and groups of the public as the audiences, the others being: enlightenment of the public, bringing about attitudinal and behavioural change, legitimation, action taken to reduce flood risk, risk reduction, emergency preparedness, public involvement and public participation (Covello et al. 1986 and Kellens 2011).

Historically, thinking on risk communication approaches have evolved from 'top-down' or 'technocentric' approaches to more recent 'horizontal' or 'stakeholder engagement' approaches (Fischhoff 1995) which entail public involvement and public participation. It has been stressed that management of stakeholder engagement process should be informed by best practice guidelines, for example the 'Seven Cardinal Rules of Risk Communication' proposed by Covello and Allen (1988) or similar ones by Glicken (2000). More importantly, it has been argued that, it should address various competing knowledge claims of the various social actors (agencies and communities) which affect public behaviour, expectations and government response, and therefore the effective delivery of risk management responses (Thorne et al. 2007). Competing knowledge claims arise due to differing perceptions of risk by the relevant social actors, broadly categorised as the outsiders and the insiders (Pike 1967 cited in Fielding and Fielding 2008). The outsiders' perspective is termed as the etic perspective and it can be associated with the various risk communication agencies. Similarly, the insiders' perspective is termed as the emic perspective and it can be associated with the communities living in the concerned areas, which is termed as 'at risk' areas by the agencies.

It has been argued that the etic and emic perspectives can be converged through flood risk communication (Schelfaut et al. 2011). As best practice for converging perspectives, Lidskog (2008) recommends that demarcations in knowledge claims between science and lay people should be transgressed through a democratisation of science and a scientisation of the citizenry. Thus, addressing knowledge claims to converge the etic and emic perspectives can be best achieved by creating spaces for

deliberation and negotiation (Jasanoff 2005 cited in Lidskog 2008) and by bridging any differences in understanding and perceptions through dialogue. Habermas's Theory of Communicative Action advocates such a space for dialogue. It calls for 'communicative action', where social actors engage in communication with a desire to develop shared understanding on given issues or matters which are marred with controversies or different viewpoints (Habermas 1984), such as the 'knowledge claims' associated with the etic and emic perspectives on flood risk introduced earlier. Thus, communicative action facilitates not only transmission (one- or two- way flow of information) but also generation of shared knowledge, the knowledge that takes account of socio-cultural aspects of the social actors.

Media play the role of information intermediaries by facilitating either one- or two- way flow of information between social actors in the process of stakeholder engagement. But research on the effectiveness of media for flood risk communication which can inform media selection is rare and unsatisfactory (Höppner et al. 2010; Macias et al. 2009; Coombs & Holladay 2009 and Schultz et al. 2011). However, a recent media theory proposed by Dennis et al (2008) called Media Synchronicity Theory was identified as promising, primarily because it embodies elements such as conveyance (creation of new knowledge and understanding) and convergence (transmission of short messages to develop agreement) which align well with the subtasks of flood risk communication, flood risk awareness raising and issuing flood warnings respectively.

This paves the way for a reminder of the main aim of the thesis which was: to identify gaps in flood risk perspectives between 'communicating agencies' and 'communities at risk of flooding', and to evaluate suitability of various media types for flood risk communication.

On theoretical fronts, the research also aimed to provide a framework based on Habermas's Theory of Communicative Action to facilitate bridging of any gaps between the etic and emic perspectives and to generate useful information to facilitate selection of media that are most suitable for communication on flood risk by reviewing applicability of Media Synchronicity Theory.

The following five objectives were outlined to address these aims:

1. To understand community knowledge, expectations, and media usage and preferences related to flood risk communication
2. To review communication objectives and efforts of the responsible agencies
3. To identify differences between community knowledge, expectations, media usage and preferences, and the communication efforts of the responsible agencies
4. To appraise the role of Habermas's Theory of Communicative Action and Media Synchronicity Theory in supporting the development of flood risk communication strategies
5. To consider the implications of the findings for developing effective flood risk communication strategies by the relevant agencies and make appropriate recommendations

The next section demonstrates how these were fulfilled by the research presented in this thesis.

9.3 Appraisal of fulfilment of research aim and objectives

To fulfil the aim and objectives of the research, Chapter 2 explored how flood risk perspectives of the 'communicating agencies' (etic perspective) are formed and identified these agencies for the research whereas Chapter 3 presented a framework for developing a flood risk communication strategy by identifying the factors influencing the flood risk communication process. Chapter 4 then presented the research methodology which included engagement with the 'communities at risk of flooding' and the 'communicating agencies'. This methodology was used to fulfil the aim and objectives of the research and is detailed below.

To fulfil the first objective of the research, data were collected through postal survey, one-to-one interviews and focus group discussions and analysed by using quantitative and qualitative analyses techniques. These analyses are presented in detail in Chapters 5 and 6. Interviews of agencies relevant to flood risk communication were conducted to fulfil the second objective of the research. It should be noted that the interviews were conducted prior to the implementation of the Flood Risk Management (Scotland) Act

2009, which now specifies the responsibilities of specific agencies with respect to flood risk communication. The analysis of the interview data is presented in Chapter 7.

The third objective entailed carrying out comparative analysis of the findings pertaining to the above two objectives and is presented in detail in Chapter 8. The analysis resulted in many useful findings and conclusions, the main conclusion being a clear lack of engagement by the agencies with the communities as the key stakeholder. The conclusions of the research are presented in the following section, section 9.4.

The main aim of the research which relates to investigating gaps in knowledge claims between key stakeholders on flood risk communication has roots in social theories of which Habermas's Theory of Communicative Action was selected for this research. Furthermore, Media Synchronicity Theory was selected for this research to appraise its usefulness in informing selection of media for flood risk communication. Appraisal of these theories, presented in section 9.5, formed the fourth objective of the research and also constitutes the theoretical contribution of the research.

The fifth objective of the research was to consider the implications of the research for developing effective flood risk communication strategies and to formulate appropriate recommendations for raising flood awareness and issuing timely and effective flood warnings. This is fulfilled in section 9.6.

9.4 Conclusions of the research

From the findings of the research, it was concluded that the perspectives of communities residing in areas at risk of flooding and those of the communicating agencies on issues related to flood risk varied significantly. In particular, community engagement or 'communicative action' as proposed by Habermas's Theory of Communicative Action, and evaluation of flood risk communication efforts to support the generation of shared understanding on flood risk between communicators and communities at risk of flooding was found to be lacking.

Instead, it was found that the flood risk communication in Scotland was mostly one-way or top-down and also far removed from the viewpoints of the communities and their

needs, and thus in contrast to recommendation by literature, for example, Molinari & Handmer (2011), Hansson et al. (2008) Bouder (2009) and Schelfaut et al. (2011). This form of flood risk communication is not congruent with the adaptive governance of flood risk as promoted by Sustainable Flood Risk Management (SFRM) in Scotland (Cashman 2007) because it does not include 'a multi-layered web of horizontally and vertically aligned stakeholders who orient themselves and work together' by including societal and environmental concerns. This had led to substantial communication gaps at a number of levels: in terms of knowledge, levels of preparedness, understanding of responsibilities and sources of information as well as the many expectations the communities had which differed significantly from the understandings of the communicating agencies. There were also serious gaps in terms of media use and preferences between communicating agencies and the concerned communities at risk of flooding. A further observed phenomenon was loss of trust and credibility of the agencies amongst these communities.

Surprisingly, despite provisions in the legislation in the form of Civil Contingencies Act 2004 and the Flood Risk Management Scotland (Act) 2009, which was enacted soon after the interviews with agencies in this research had taken place, none of the investigated agencies, except one local authority, perceived that it was legally responsible for flood risk communication. Although the agencies were working under the aegis of Scottish Government's Strategic Coordination Group (SCG) and the representatives of the agencies believed that their roles and responsibilities in relation to flood risk were clearly delineated, the research found that there were numerous gaps and overlaps in their roles and responsibilities.

The agencies carried out some flood risk communication, but none of the agencies practiced a credible flood risk communication strategy and mostly resorted to opportunistic flood risk communication. The main emphasis of the agencies was on issuing flood warnings and providing some assistance to the public during emergencies. Their flood risk communication activities were found to be inadequate in ensuring that the population was adequately informed of important aspects surrounding flood risk. Additionally their roles and responsibilities were not clearly understood by the communities. This was found to be seriously affecting flood risk communication in Scotland.

Further, the agencies did not systematically evaluate their communication efforts to understand the effectiveness of their communication efforts and thus did not have access to any feedback which could be considered in improving subsequent flood risk communications strategies. In particular, the flood risk communication strategies did not account for the reflexive nature of emic perspectives which affect the effectiveness of flood risk communication efforts. Additionally, it was found that the communities living in areas identified to be at risk of flooding were not very confident in relation to obtaining flood warnings or judging likely flood emergencies. However, they had specific expectations with regard to flood warnings which related to timing, relevance, accuracy, content and media selection; they expected much more information related to flooding emergencies which went well beyond issuing a general warning. Fulfilment of these expectations would require many changes, not only as to how flood warnings are issued but also in relation to the technology defining the many attributes of flood warnings and the supporting infrastructure. These findings can be used to inform flood warning strategies of the relevant agencies and also to plan for upgrading of their infrastructure and resources.

On sources and media for flood risk communication, the research found that interpersonal communication played a major role. In contrast, official agencies like SEPA did not feature as major sources of information. Instead, the research found that the communities preferred TV, brochures and leaflets, radio, visit to properties and exhibitions for flood risk awareness related information whereas TV, radio, phone call, mobile phone text message (SMS) and public announcement systems such as loudspeakers or sirens were preferred for flood warnings. It also revealed specific communication needs relating to technical or personal difficulties in using some of the media, particularly among the elderly, which affected their choice of media. The communities also identified many more media such as marks on bridges and display boards near rivers for flood warnings. Thus, it can be concluded that a wide range of media should be considered for flood risk communication, and that these are likely to differ, depending on whether the purpose is to raise flood risk awareness or to issue flood warnings.

The research also makes a specific contribution in evaluating the usefulness of Media Synchronicity Theory for informing media strategies for flood risk communication,

discussed further in section 0. It found that personal, social, institutional and situational factors influence media selection and preferences for flood risk communication. The research demonstrated that Media Synchronicity Theory is not fully applicable for identifying media which can support flood risk awareness and warning tasks. However, it was demonstrated that the theory may be improved to support these tasks with revisions to the key components of the theory, especially the factors deciding the synchronicity of a media. This theoretical contribution may also apply to communication of other hazards apart from flood risk, particularly natural hazards. This is a significant contribution to literature, particularly so when as recently as in 2010 it was observed that no literature on media preference or their effectiveness for flood risk communication was available (Höppner et al. 2010). This thesis makes a substantial contribution to filling this gap.

The research findings elicited several recommendations and requirements for improving flood risk communication, many of which were in agreement with the views of agencies: in terms of better understanding of flood risk, identifying communities at risk of flooding, proactively issuing meaningful awareness and warning messages through a wide range of media and languages after ensuring that the messages were relevant and specific so as to meet the needs of different groups of people, such as different ethnic groups and disabled people. This can be used to inform more appropriate flood risk communication strategies.

This research elicited the findings and conclusions presented in this thesis so far on specific issues related to flood risk communication by interacting with the communities and agencies. Thus, this thesis benefits from following the principles of Habermas's Theory of Communicative Action for evaluating flood risk communication activities and generation of shared knowledge which entails 'communicative action'. The findings relating to the examination of flood risk communication activities and the generated shared knowledge, which takes into account the socio-cultural aspects of the social actors, have led to place- and agency-specific policy recommendations (see section 9.6) for developing flood risk communication strategies. . These strategies are likely to contribute to bridging gaps between 'at risk' communities and agencies, thus ensuring that the flood risk communication activities serve their purpose effectively; be it in terms of warning or raising awareness of flood risk. At this juncture, it should be

warned that, although this thesis, which is an effort by a lone researcher, has generated important findings, it should not be viewed as a direct replacement of efforts that need to be taken by the concerned agencies to ensure relevance and fit-for-purpose.

9.5 Theoretical contribution of the thesis

In relation to the fourth objective of the research, this section presents an appraisal of the role of Habermas's Theory of Communicative Action and Media Synchronicity Theory in supporting the development of flood risk communication strategies. The appraisal is arranged in two subsections, subsections 9.5.1 and 0.

9.5.1 Habermas's Theory of Communicative Action

Habermas's Theory of Communicative Action, presented in detail in section 3.3.1, was examined for its applicability in relation to supporting the development of flood risk communication strategies, particularly for bridging gaps between communicating agencies and communities. This theory was selected since literature (Jasanoff 2005 cited in Lidskog 2008 and Boholm 2008) identified it as containing elements which can support two-way communication in the form of deliberation and negotiations (which together would constitute dialogue as termed by Habermas). The Theory of Communicative Action contends that communication gaps can be bridged through communicative action and it involves sharing a platform for the purpose of developing common understanding through dialogue. Communicative action is contended to lead to creation of shared knowledge and as such reduction of communication gaps which is congruent with developing shared understanding of flood risk between communities and agencies, thus reducing communication gaps and contributing to more effective flood risk communication. This section assesses the applicability of this theory in the context of the research presented in this thesis. Habermas's Theory of Communicative Action requires that the relevant social actors possess mutual desire to reach understanding and agreement on a given issue, which is flood risk in the context of this thesis. This was found to be valid on the part of the communities which showed willingness in understanding and learning about flood risk, and also sought information on many relevant topics such as action for protecting lives and properties from the risk of flooding. Similarly, the agencies showed a desire for their efforts and messages on flood risk to be understood by the communities.

However, a mutual desire to reach understanding and agreement on issues also concerns the question of whether relevant social actors are willing to hold a dialogue to reach understanding and agreement. As stated, although the communities were willing to engage in communication, the communication formats used by the agencies were top-down or one-way communications, with no past records or future provisions for dialogue to reach shared understanding and agreement on flood risk. Thus, this requirement of the Habermas's Theory of Communicative Action was found not to be fulfilled. Therefore, as expected the research found gaps related to flood risk communication between the agencies and the communities.

Habermas's Theory of Communicative Action also argues that dialogue fails if the participating social actors have different ideas of what is being discussed and even how 'agreement' is being defined. It further argues that the principles of making agreements are embedded in social norms, values and beliefs and that society is governed by rules that permit some actions whilst inhibiting others, thus rules act simultaneously as enablers as well as objectors of the actions that can take place within society. As the above paragraph states, the communications were top-down or one-way communications and entailed no known consideration of social norms, values and beliefs such as tailoring the communications for the target audience, except for some adaptation efforts such as SEPA conducting plays for school-children and the willingness of the agencies to adapt. On the content of communication, it was found that the topics of the flood risk communication, both for awareness raising and for flood risk warning, were found to be different for the agencies and the communities. The difference was not limited to only topics, but extended into other areas, such as the relevance of information, timing of dissemination, and other relevant responsibilities and activities of the agencies. Thus, while the risk communication agencies and the relevant legislation were concerned with the flood risk communication activities and legal requirements for flood risk communication, since there was no attempt to reach agreement on the topics to be covered, and since conformity to social norms, values and beliefs was only partial, the process of flood risk communication was found to be seriously flawed.

On the capacity of self-transformation of society, termed as 'reflexivity' in other social theories, Habermas's Theory of Communicative Action describes the public sphere as

being an intellectual, political and cultural domain in which established ideas can be challenged and new ones explored. According to Habermas's Theory of Communicative Action, social actors engage with communicative action with each other and progress towards negotiated agreements by drawing on their knowledge and accumulated experience and by consolidating agreement about underlying social norms, values and beliefs. Through this process they create shared knowledge. Thus, meaning or agreement is something that arises out of communicative action on passing the tests of righteousness for the given circumstances and contexts, or the tests of social rationality and reflexivity, which essentially means that the meaning or agreement reached through communicative action already entails social acceptance. It was found that flood risk communication in Scotland did not find full social acceptance the reason for which can be attributed to such communication only partially meeting the test of social rationality since there was limited communicative action for flood risk communication.

Further, according to Habermas's Theory of Communicative Action, the reached meanings or agreements are embedded within the context where they occur and these tend to have temporary quality. This means that with the dynamic nature of social rationality, the meanings or agreements also need to be revised. Thus, additionally, this also means that the flood risk communication efforts need to be ongoing. In contrast, this research found that the flood risk communication efforts were opportunistic rather than being scheduled on a regular basis which did not conform to this principle of Habermas's Theory of Communicative Action. In this sense, the efforts of agencies also did not consider the dynamic nature of social rationality.

In summary, the research found that the communication practices at the time of research in Scotland were predominantly top-down in nature and also tended to be detached from the viewpoints of the communities and their needs and expectations which had led to substantial communication gaps. The research also traced many of the communication gaps to differing knowledge claims, such as sources and causes of flood risk, and responsibilities for flood risk communication. The interactions with the communities were found to be useful in identifying communication gaps and developing understanding on various related issues. Such knowledge can then be usefully considered towards development of more informed flood risk communication strategies

such as the ones presented in section 9.6. Thus, it was found that, as Habermas's Theory of Communicative Action claims, dialogue between social actors leads to the development of knowledge and communication strategies which additionally account for social rationality and reflexivity. Such communication strategies would obviously result in much reduced communication gaps and would therefore be more effective. The dialogue with the agencies responsible for flood risk communication also revealed many useful findings which can be considered by the agencies and the Scottish Government for improving and supporting flood risk communication in Scotland.

However, beyond development of shared understanding and generation of strategies, the task of flood risk communication also includes a subtask of warning the communities. Practicing 'communicative action' as proposed by Habermas's Theory of Communicative Action does not fulfil this subtask of flood risk communication and as such is a limitation of the theory. Furthermore, the theory does not consider institutional constraints into account, for example, the skilled manpower and funding requirements in order to undertake 'communicative action' in the first place but also to carry out and then evaluate and analyse flood risk communication activities. The theory also does not provide specific support to engaging the different groups within communities, which may be categorised based on factors such as age, language, disability and location, for flood risk communication. This has been termed as 'audience segmenting' and is especially useful for ensuring that flood warnings reach to all members of the communities, thereby helping in reducing damage and risks to lives.

Importantly in the context of the aims of this thesis, Habermas's Theory of Communicative Action does not provide specific guidance on the media for 'communicative action'. However, the research selected a media-specific theory, specifically related to this and is discussed in the following subsection.

9.5.2 Media Synchronicity Theory

As explained while discussing the evolution of flood risk communication in section 1.4, the task of flood risk communication can be categorised into two subtasks: i) issuing warnings, which requires a quick timescale in terms of speed of communication and response, typically achieved by one-way transmission of information, and ii) raising awareness, typically undertaken over a comparatively leisurely timescale in order to

generate shared understanding, argued by Habermas's Theory of Communicative Action to be best achieved through dialogue. Various media, as the tools for communication, play the vital role of facilitating flood risk communication, be it dialogue or one-way transmission of information. As explained in section 3.4, Media Synchronicity Theory was adopted for this research to establish the degree of congruence of the etic perspective of the agencies with the emic perspective of the communities on selection of media for flood risk communication and as such its usefulness for informing media selection for flood risk communication.

Media Synchronicity Theory argues that there are two aspects of a communication task: conveyance and convergence. Depending on what level of conveyance (exchange of information) and convergence (development of a shared meaning) a given media supports, that media is argued to be suitable for certain tasks. As shown in Table 3.1, conveyance processes are argued to be effective if media supporting lower synchronicity are used for communication involving development of knowledge or to generate understanding. Convergence processes are argued to be effective when media with higher synchronicity are used to transmit unequivocal messages such as transmission of a short message.

The overall task discussed in this thesis is 'communicating flood risk', of which 'flood risk awareness' and 'flood risk warning' are two subtasks (see section 3.4). The 'flood risk awareness' task is analogous to development of knowledge, generating understanding and building a mental model. According to Media Synchronicity Theory this process would be effective if media supporting conveyance and hence media with low synchronicity are used. The task 'flood risk warning' is analogous to transmitting short messages so that the recipients can relate this information to their knowledge or mental models and arrive at a shared meaning or make sense of the information. According to the Media Synchronicity Theory this process would be effective if media supporting convergence and hence media with high synchronicity are used.

According to the Media Synchronicity Theory, synchronicity of a media is evaluated against five capabilities of that media: symbol sets (number of ways in which a medium allows information to be encoded for communication), parallelism (the number of simultaneous transmissions that can effectively take place), transmission velocity (the

speed at which a medium can deliver a message to intended recipients), rehearsability (the extent to which the media enables the sender to rehearse or fine tune a message during encoding) and reprocessability (the extent to which the medium enables a message to be re-examined or processed again). Figure 3.2 depicts these media capabilities and Table 3.2 presents the synchronicity values of some of the most commonly used media: face-to-face, video conference, asynchronous electronic mail / conferencing, voice mail and documents. However, this thesis discusses many more media. All the media investigated in this research and the synchronicity values assigned to these media are presented in Table 9.1. Their synchronicity values are derived by carefully matching them with the media having similar capabilities listed in Table 3.2. For example, newspapers, brochures and letters are matched with documents; recorded phone call message is matched with voice mail; radio, TV and e-mail are matched with asynchronous electronic mail; exhibitions & seminars are matched with face-to-face communication and so forth.

Table 9.1 Media and their synchronicity based on Dennis et al. (2008)

Media	Similar media as assessed by Dennis et al. (2008)	Media capabilities as assessed by Dennis et al. (2008)					Synchronicity as assessed by Dennis et al. (2008)
		Symbol sets	Parallelism	Transmission velocity	Rehearsability	Reprocessability	
Newspaper Brochures Booklets Leaflets/pamphlets Letters	Documents	Few-Medium	High	Low	High	High	**Low**
Loudspeaker / Public announcement system Television news and programs Television-teletext Radio Internet E-mail	Asynchronous electronic mail	Few-medium	High	Low-medium	High	High	**Low**
Phone call (recorded) Text message	Voice mail	Few	Low	Low-medium	Low-medium	High	**Low**
Exhibitions & seminars Visit to property	Face-to-face	Few-many	Medium	High	Low	Low	**High**

As stated earlier, conveyance processes are argued to be effective if media supporting lower synchronicity are used for the communication involving development of knowledge or for generating mental models. For flood awareness raising efforts to be effective, the information needs to be understood by the audience. Therefore, for this task to be successful, the conveyance of the message is important – meaning the media employed should have low synchronicity. The findings related to the preferred media for flood risk awareness presented in the previous section indicate that TV, brochures or leaflets, radio, internet and exhibitions were the preferred media by the people. Examination of the synchronicity values for these media in Table 9.1 confirms that all these media, except exhibitions have low synchronicity. Thus, Media Synchronicity Theory appears to be valid in identifying most but not all media for flood risk awareness purposes.

Similarly, convergence processes are argued to be effective where transmission of an unequivocal message (such as transmission of a short message containing specific information only) is involved. The media employed for flood warning needs to be ones which have high synchronicity values as this communication task mainly involves transmission of short unequivocal messages. The findings related to the preferred media for flood warning presented in the previous section indicate that TV, radio, phone calls, visit to property, a mobile phone text message and public announcement using a loudspeaker or siren were the media preferred by the people. However, the synchronicity values for these media in Table 9.1 show that except for visit to property all the other media have low synchronicity. Thus, Media Synchronicity Theory is limited in not predicting the preferred media for flood warning purposes among communities living in areas at risk of flooding.

There are a number of potential explanations for this. Firstly, the synchronicity values assigned to the various media are questionable. According to the assumptions of the Media Synchronicity Theory, a media supporting the transmission of short messages which needs to reach large number of people fairly quickly (transmission velocity and simultaneously parallelism) should be assigned high synchronicity. This should be the case even if the media only supports a few characters (symbol sets) and does not support fine tuning of messages to suit individuals (rehearsability) or re-examining once transmitted (reprocessability).

However, the media having these capabilities, for example, text message and voice mail (and also radio, television and email) have been assigned low synchronicity. Secondly, a more detailed study of the Media Synchronicity Theory reveals that the theory does not provide any explanation of what weights the individual capabilities of media carry when the synchronicity for a particular media is determined. From Table 9.1 it can be observed that the media capabilities do not carry equal weights when determining the synchronicity. For example, the values for two of the five media capabilities for face-to-face media are 'low', a further two are 'few-many' and 'medium'; only one media capability being 'high'. Despite these range of values, face-to-face media is assigned 'high' synchronicity. Similarly, the media capability values for three of the five media capabilities for asynchronous electronic mail are 'high' and a further two are 'few-medium' and 'low-medium'. Again despite this range of values, this media is assigned 'low synchronicity. A further noteworthy feature of the Media Synchronicity Theory is that the synchronicity values lack clarity. To be specific, synchronicity values are expressed as low, low-medium, medium-high and high. However, all media having the same value for synchronicity, such as low, are unlikely to support a communication task equally. A numerical value for the synchronicity, such as 8 out of 10, may be a better way of assigning a synchronicity value to a media. Such a methodology would clearly identify the priority of a media compared to others in supporting a particular communication task.

A literature search for the use of Media Synchronicity Theory in identifying media selection for flood risk communication or communication of risks due to other natural hazards did not yield any results except for one study by Muhren published in 2011. As explained in this section, this study found that low synchronicity media, contrary to what the Media Synchronicity Theory proposes, do not support conveyance processes. The current research adds further evidence and analysis, which questions the adequacy of Media Synchronicity Theory in explaining preferred media selection for flood risk communication. However, the fault may lie in how the synchronicity values have been assigned rather than in the theory itself. It could be the case that the synchronicity values are based on the context of the communication, for example internal communications of an agency, communications from university to its students, routine communication rather than risk communication. If that is the case, then it can be argued that Media Synchronicity Theory needs further refinement to clarify the relevance of context in determining the synchronicity of various media. Otherwise it can be argued

that it too suffers from the same constraint as that of Media Richness Theory which was argued to lack context. Therefore, it can be concluded that further research to evaluate the media capabilities and their synchronicity is necessary to develop the theory for the purposes of flood risk communication.

It is also noteworthy that the Media Synchronicity Theory relies on the capabilities of the media alone. In contrast, many other factors influence media use and preference, for example Social Amplification of Risk Framework (SARF), argues that various psychological, social, and institutional factors influence risk perceptions and behaviour through a network of socially mediated communication channels. Furthermore, Beck's Theory of Risk Society suggests that trust is a powerful factor influencing receptiveness of risk communication messages through media; Giddens's Theory of Reflexive Modernity proposes influence of rules-and-resources, such as legislation and policies, on risk communication; and Habermas's Theory of Communicative action proposes that various factors, such as rationality, reflexivity, norms, values and beliefs of the society influence the process of communication. This proposition, that apart from media capabilities many other factors influence media use and preference. is reinforced by the research findings where section 8.2.1 to 8.2.3 indicates the influence of socio-demographic factors, and existing knowledge and awareness on choice of further information which in turn affects the selection of media for flood risk communication and section 8.2.4 indicates that media issues such as availability, cost, technical or personal difficulty, privacy concerns and personal preferences affect media usage pattern and preferred media for flood risk communication, thus reinforcing the limits of Media Synchronicity Theory. Additionally, the findings presented in section 8.3 on the role and responsibilities of individual agencies indicate the influence of institutional factors on media selection – this is a complicating factor because preferences of the agencies for media selection clearly do not match the preferences of the communities.

In addition to failing to account for such factors, the Media Synchronicity Theory's proposition that 'media synchronicity may differ from person to person and over time' without specifying how these can be assessed and managed undermines its credibility. In summary, therefore, it is argued that Media Synchronicity Theory suffers from limitations in identifying media which can support better flood risk communication performance. These findings are similar to the limitations of Media Richness Theory, as mentioned in section 3.4.1, which has been argued to fail in taking into account new

media, context and situational factors such as availability, accessibility, experience with the media, personal preference and social influence.

Finally, although Media Synchronicity Theory embodies 'convergence' which relates to the process of development of shared understanding and which is analogues to dialogue on flood risk issues to awareness enhancement as proposed by Habermas's Theory of Communicative Action, it fails to explicitly specify that such a process would require two-way flow of messages. With the current specifications, it appears to be more a linear one-way process analogues to top-down communication as opposed to a two-way process analogues to horizontal communication. Nevertheless, it is acknowledged that 'convergence' can be achieved through two or more instances of one-way communication. As such, it can be suggested that the theory may be updated to explicitly clarify its proposition in terms of the direction of flow of messages.

9.6 Policy implications and recommendations for developing effective flood risk communication strategies

As required by the fifth objective of the research, this section considers the policy implications of the research findings for developing flood risk communication strategies and also makes recommendations to key agencies.

9.6.1 Need for agency specific flood risk communication strategies

The first and foremost of the recommended policy implications relates to one of the major findings of this research; that despite provision in the legislation in the form of Civil Contingencies Act 2004, none of the agencies considered in this research had a credible communication strategy, which if followed or practised, can effectively bridge the gap between the communicating agencies and the communities, support Sustainable Flood Risk Management promoted in Scotland, and additionally meet the flood risk communication related requirements of recently legislated Flood Risk Management (Scotland) Act 2009. It was found that all the agencies perceived flood risk communication to be the responsibility of SEPA whereas SEPA stated that it was doing so proactively or at its own discretion only. Although there is general consensus that SEPA is 'the flood risk communication' agency within the Strategic Coordination Group which oversees the Scottish Government's emergency response strategy, this was not the view of the communities studied. Therefore, it is recommended that flood risk communication strategies which clearly publicise the roles and responsibilities of all

relevant agencies should be developed on priority by all the agencies identified by the Act, these being: Scottish Government, SEPA, the 32 Scottish Local Authorities, Scottish Water and Scottish Flood Forum.

9.6.2 Need to understand elements of flood risk communication

To aid in the formulating of flood risk communication strategies, reference can be made to the structure of a flood risk communication strategy which is presented in Chapter 3. This structure depicts the many facets of flood risk communication. Its building blocks or stages were derived after carrying out a comprehensive literature review which is presented in Chapters 2 and 3, these being:

Stage 1: Understand the process of risk communication and the influencing barriers and factors (through participatory communication)

Stage 2: Assess current knowledge, needs and expectations of the communities at risk of flooding (through participatory communication)

Stage 3: Assess and if required establish trust with communities at risk of flooding

Stage 4: Review organisational resources and systems for flood risk communication through internal review

Stage 5: Identify topics and media for flood risk communication for reaching a shared understanding with the communities

Stage 6: Carry out flood risk communication (through combination of both top-down or participatory communication as appropriate)

Stage 7: Evaluate communication efforts and feedback to Stage 1

This research has collated comprehensive information and has derived many relevant findings which are presented in detail in the previous chapters. In lieu of any communicative action, these findings can be taken as a starting point by the agencies to fulfil these stages, particularly Stages 1 to 3 and 5. The thesis also makes many relevant recommendations and comments in this chapter useful for Stages 4, 6 and 7.

It shall, however, be recalled that this research has found, in agreement with the arguments by social theorists Beck and Giddens, that the perspectives, perceptions and expectations of the members of the communities varied from area to area and were influenced by a complex set of factors which included factors such as individual perceptions of level of risk, previous exposure to floods, perceptions of the

responsibilities of key agencies, their information sources and media, demographic factors, geographic location and community size. Furthermore, literature warns that a single best practice guide to risk communication is neither appropriate nor achievable (Burton et al. 1993 cited in Höppner et al. 2010) and rather, communication has to be adapted to the characteristics of the hazard (Faulkner 2007), the expected intensity and impacts of a particular event, the context of the communities at-risk, the characteristics of the receiver, the objectives of communication and the stage in the risk management cycle. Therefore, the findings presented in this thesis should be treated as informative rather than a prescription-for-success.

9.6.3 Need of engaging with communities as partners and to build trust

It should be noted that the above recommended flood risk communication strategy lists the actual task or stage of communication – which is often a top-down communication approach – to be the sixth in the line. This means that prior to carrying out a flood risk communication there are other stages to go through. It should also be noted that Stage 1 to Stage 3 and Stage 6 require that the communication be participatory in nature. This highlights the need for including stakeholder engagement within a flood risk communication strategy (discussed in more detail in section 3.5.1). This relates to the second major finding of this research which identified that none of the agencies had or were considering including the public as one of the stakeholders or a legitimate partner in the process of flood risk communication.

The flood risk communication approach in Scotland was found to be mainly a top-down communication approach in contrast to the two-way or participatory approach depicted in the flood risk communication strategy outlined above. To emphasise this finding through an example, reference can be made to SEPA's recent document titled 'Flood Risk Management Planning in Scotland: Statement of Consultation Arrangements'[20] and to the analysis presented in sections 2.5.1 and 8.3.1 which demonstrate that stakeholder engagement in flood risk communication is hardly being practised in Scotland. Even after implementation of the FRM(S) Act, the flood risk awareness raising efforts in Scotland in their current form were oriented towards 'educating' the at risk communities instead of engaging with them (see section 2.5.1) and therefore such

[20] Available on SEPA website at http://www.sepa.org.uk/about_us/consultations/closed_consultations.aspx. This was originally published for consultation in Dec 2012 and was open for comments until 22 March 2013. This has now been published in Jun 2013.

practices, as pointed out by Stickler et al. (2011), may lead to losing the trust of the communities. As such it is recommended that the scope of the FRM(S) Act should include requirements to hold dialogue with the communities; which means engaging with the communities as a legitimate partner in decision making. This can be enacted by placing a duty to do so on SEPA, local authorities, Scottish Flood Forum and relevant organisations identified by the FRM(S) Act.

9.6.4 Need for awareness raising through 'communicative action'

Previous studies have emphasised the need for raising awareness on flood risk issues, particularly for ensuring an appropriate response to warnings (Hurnen & McClure 1997 and Siegrist & Gutscher 2006), also terming it as a prerequisite for ensuring effectiveness of warnings (Hansson et al. 2008, Molinari & Handmer 2011). Thus, the task of raising awareness on flood risk issues is intricately linked to development of shared meaning and knowledge, which Habermas contends to be best supported by 'communicative action'. Communicative action ensures that the shared meanings and outcomes of stakeholder dialogues on the issues under discussion comply with social norms, values and beliefs and also take into account the knowledge and experience of the individual stakeholders. It is also linked to the 'conveyance' aspect of Media Synchronicity Theory which entails conveyance of messages to generate shared knowledge on issues under discussion.

This research identified many shortcomings in the flood risk awareness activities practiced in Scotland which can be traced to the legislative and policy framework. Firstly, the main legislative framework in this area, the Civil Contingencies Act 2004 and the FRM(S) Act, fall short in requiring that flood risk awareness be given adequate prominence. The ministerial guidance on delivering sustainable flood risk management complementing the FRM(S) Act identifies 'a well informed public who understand flood risk and the actions they can take to protect themselves, their property or their businesses' as one of the overarching outcomes of implementation of this Act. However, it does not give statutory responsibility to SEPA or any other agency to conduct flood risk awareness activities similar to the statutory responsibility on flood warning activities. Secondly, in addition to the shortcomings in the policy and the legislative framework, the research found that the flood risk awareness efforts were inadequate in ensuring that the public was appropriately informed and prepared for any future flooding events.

Therefore, it is recommended that in addition to inclusion in the legislation, flood risk awareness activities be established and informed by some of the main findings of this research. These include findings which relate to topics for communication as explained in the next section, the need for information-tailoring for different socio-economic groups and the need for a pro-active dissemination strategy. This will ensure that the agencies would engage with the communities, remain proactive and in this process build trust through 'communicative action'. This is thought to help significantly in enhancing community preparedness against flooding and in ensuring that flood warnings are effective in enabling communities to take the necessary actions to protect themselves and their properties.

9.6.5 Need to identify topics for flood risk communication

This research found that the topics on which the agencies provided information were substantially different from the topics on which the communities sought information on. Similarly, the flood warnings did not contain information which met the expectations of the communities, particularly in relation to timing, accuracy, relevance and sources of flooding for further information and help. Unless the topics of information of flood risk communication match the topics which people expect information on, it is unlikely that shared understanding on issues between communicating agencies and communities would be developed. Therefore, it is recommended that the relevant agencies, particularly SEPA and the local councils should engage with the communities to understand the information requirements of communities and to develop shared understanding on issues. This research has nevertheless generated a list of topics which can be usefully considered, the topics being: emergency action plans, Community Risk Register, emergency refuge centres, information on flood protection products, sources of information, emergency contact details, and flood warnings which specify some measure of severity, timing of flooding, areas likely to be affected, contact details for further information or assistance and other relevant information such as expected rainfall and tide times. It should, however, be borne in mind that this is by no means a comprehensive list and should not be used to replace consultation with the communities to ensure that no community specific issues are overlooked.

9.6.6 Need for timely and effective flood warnings

The research found that the issued flood warnings were not considered to be adequate and appropriate by a significant proportion of the population. In contrast to common

expectations of receiving warnings in sufficient time so as to enable protective and preventive actions to be taken, warnings were reported to be issued very late and there was a perception that the authorities were withholding information which should be passed on to the public. SEPA's flood warnings were confirmed to cover a large geographical area and as such were perceived by the communities as lacking relevance to them. Further, such information was only available through internet or on phoning and was perceived, in some cases, to be lacking in timeliness. The research identified several suggestions which can be considered by flood warning authorities, especially SEPA and the local authorities, to improve the effectiveness of flood warnings. These include increasing the relevance of the warnings to people; providing estimates of the severity of likely flooding events and contact details for further information and assistance, and media selection. Further, it was observed that emergency services had valuable information on the potential areas at risk of flooding which could be more effectively shared with other agencies for improved flood risk communication.

9.6.7 Need for information tailoring

Analysis of the socio-demographic profile of communities living in flood prone areas identified many distinct groups of people, for example, people with prior flood experience, home owners and elderly people who do not use mobile phones. Therefore, it can be emphasised that the communities living in flood prone areas should not be treated as one homogeneous target group. A communication strategy to inform and warn such diverse target groups should be framed in such a way so that all subgroups are appropriately attended to. Attention should be paid to ensuring that groups of people of different ages, both genders, from different language backgrounds, with or without prior flood experience, those living in their own homes or renting properties, new arrivals or established residents as well as people with limited mobility are included in communication strategies. Failure to ensuring this may lead to the exclusion of certain people which could have serious implications. Such information tailoring and then flood risk communication can be achieved by following 'strategic marketing' or 'social marketing' approaches. Local issues and situations may also significantly affect the topics and therefore these should be prioritised in flood risk communication. Current efforts to provide tailored information were also found to be inadequate. Further, it was found that some people living in areas identified to be at risk of flooding were not able to be identified due to data protection legislation, for example people with limited mobility due to short or long term illness. This could

increase the vulnerability of certain groups to flooding. It is thus recommended that more attention be paid to identifying such groups and information tailoring to ensure that all sections of the population benefit from flood risk communications.

9.6.8 Media for flood risk communication and community engagement

The research also considered the role of media, especially the selection of media for undertaking the two distinct tasks of flood risk communication: raising flood risk awareness and issuing flood warnings. The research found that people did not have privacy concerns if a media, such as visit to property or email, was genuinely used for flood risk communication purposes and private information was not shared with commercial agencies. This means that the flood risk communicators need not necessarily refrain from using any particular media for flood risk communication. However, at the same time they should limit the use of people's personal information for flood risk communication only. It was also found that the media used by people on a day-to-day basis were different from the media which they preferred for flood risk communication. The media preferred for flood risk awareness and those for flood warnings were also different. The research revealed that media selections on the part of individuals were influenced by media characteristics or their capabilities as well as other factors including situational factors and personal circumstances. This suggests that the media employed by the agencies to disseminate flood risk awareness information and flood warnings need to be more wide-ranging. Significantly, the study also found that communication through a particular media may be a need and not a choice for some people, for example people with disabilities. However, the research found no coordinated policy for media selection for flood risk communication among the agencies. For example, local authorities dropped letters and leaflets from door to door while SEPA mainly used local newsmagazines published by local councils or community councils, and their Floodline service. Further, the media preferred by the people, such as addressed printed material, TV, radio, phone calls, text messages and also exhibitions and visit to properties suggest that agencies should disseminate the information proactively rather than expecting that the people would find out the information themselves. These media sources also need to be publicised widely so that people living in flood risk areas know where to look for the information they require.

9.6.9 Need to clarify roles and responsibilities of key agencies

As mentioned earlier, it was found that all the agencies perceived flood risk communication to be the responsibility of SEPA whereas SEPA stated that it was doing so proactively only. Although it was found that the agencies were generally satisfied with the arrangement of working under the aegis of Strategic Coordination Group (SCG), these arrangements can be said to be more appropriate for dealing with flooding emergencies which should now be revised in view of the implementation of the FRM(S) Act. Furthermore, the agencies cited some gaps and overlaps in the partnership working arrangements. These are discussed in detail in section 7.4 which should be considered while developing a flood risk communication strategy by the relevant agencies.

Furthermore, the research found that although the reviewed local authorities provided some information to flood risk communities, there were differences in the information provided by them, which was found to be partly related to what the local authorities perceived their responsibilities of communicating flood risk were. The research also found that SEPA was known to be responsible for flood risk communication by only a very small section of the communities and that they were poorly informed of their own responsibilities as well as the roles and responsibilities of the relevant agencies. Many were unaware that they had certain responsibilities with respect to taking action to limit the impact of flooding in their capacity as owners or occupiers of properties in flood risk areas. Many did not know about the agencies which could provide assistance before, during and after flooding. Such lack of awareness might contribute to some people not taking appropriate action. Therefore, it can be recommended that a flood risk communication strategy should aim to clarify the roles and responsibilities of the various relevant agencies as well as those of the individuals living in flood risk areas. In addition to clarifying roles and responsibilities, a more comprehensive approach, congruent with the newly advanced concept of 'flood risk citizenship' (Nye et al. 2011) which advocates community engagement and personal or community level responsibility for flood risk planning, awareness and resilience, is also recommended.

9.6.10 Funding and need for capacity building

The research identified that the agencies needed to build their capacity on many fronts which go well beyond mere flood risk communication. On flood risk communication related roles and responsibilities, the research identified the need for further resources in

order to upgrade systems and processes and support inter-agency communication and cooperation.

As should be obvious, funding enables employment of adequate human resources, procurement of essential equipment, commissioning of operations and hence delivery of services. Almost all the agencies considered in this research expressed concerns about funding and the resulting constraints to what these agencies can do. This is also related to the need for capacity building which identifies a need to upgrade systems and processes. This need stems from the topics on which the communities expected more information. Although some of these topics – for example the topics which relate to flood risk awareness – can be addressed relatively easily, many topics – especially related to the flood warnings – may need reconfiguration of existing systems and processes or introduction of new systems and processes. It may also require additional personnel or training to existing members of staff to acquire new skills which may range from technical skills such as flood estimation skills to media and communication skills. The need to enhance inter-agency communication stems from the gaps and overlaps cited by the agencies whereas the need for inter-agency cooperation stems from a requirement that personnel, assets, data and information be shared more proactively and usefully.

9.6.11 Need for evaluating communication efforts

Evaluation of communications relates to the feedback mechanism that brings to the fore the gaps in communication efforts and the managerial aspects of performance measurement. It enables reconfiguration of communication efforts and related systems and processes so that they can be more relevant and hence more effective. Evaluation and publishing performance measurement information also helps in demonstrating commitment and competence and therefore can lead to building up of trust with the publics. However, the research found that none of the researched agencies indicated that they had established procedures for evaluating their flood risk communication efforts with the public and indicated dependence on published research and literature elsewhere, which is one of the serious flaws in their plans for communicating on flood risk; principally because such dependence may fail to account for aspects of communication that may be more important and relevant to the communities to which the communication efforts relate. Therefore, it is recommended that the flood risk

communication strategies of the relevant agencies should include mechanisms for obtaining and reviewing feedback to improve future flood risk communication efforts.

9.6.12 Need for ongoing communication efforts

Previous studies warn that the availability of knowledge of people decreases over time (Schütz & Wiedemann 2000) and continuous and longer exposure to relevant information leads to stronger risk perception (Keller et al. 2006). Sociologists, principally Beck and Giddens, also argue that risk is a reflexive social construct and therefore prone to different viewpoints through time as well as from person to person and location to location (see section 2.4). Flood risk communicators need to be aware of changing nature of risk at all times and be 'in agreement' with the communities for their communications to be effective. Therefore, it can be recommended that the flood risk communicators should not be complacent in assuming that people are aware of issues after they carry out a flood risk awareness raising exercise or community engagement event, and therefore cease consultations or engagement with the communities; it should remain as an ongoing activity.

9.7 Appraisal of research strategies and methods

The findings, conclusions, theoretical contribution and the recommendations presented in this thesis were drawn by conducting systematic research to explore the domain of knowledge surrounding the research question involving four major disciplines of knowledge: science of flood risk, media studies, public relations and social science research methods. As a first step in this direction, comprehensive literature review was carried out to explore the competing knowledge claims and the factors affecting them which also included a review of three major social theories. Further review included review of risk communication models and media theories. The research was then designed including identifying a research stance, defining epistemological and ontological positions, research strategies and then identifying research methods. This section appraises the research methodology employed for the research presented in this thesis.

Fulfilling the research objectives required that the research should be of an exploratory nature and therefore an inductive stance was employed for the research (see section 1.9 and 4.2.1). An inductive stance is best supported by interpretivism as the epistemological position because by adopting an inductive stance theory can be

generated from the analysis of data collected for a project (see section 4.2.2). As the research aims and objectives were aimed at collecting data and analysing it for generation of new knowledge about flood risk communication, interpretivism was adopted as the epistemological position for this research (see section 4.2.2). Further, pertaining to the reflexive and therefore ever changing nature of the knowledge of the social actors and their ability to influence flood risk communication, constructivism was adopted as the ontological position for this research (see section 4.2.3). This position asserts that social phenomena and their meanings are continually being accomplished by social actors, who in this instance are the communities living in areas identified to be at risk of flooding and the communicating agencies.

The research employed a qualitative research strategy, which was supported by quantitative method in the form of postal surveys. The qualitative methods used were one-to-one interviews and focus group discussions to collect data from the communities and relevant agencies. The nature of the research was exploratory and hence it justified the inductive theoretical stance and qualitative research strategy of the research. The research was able to successfully gain insights into peoples' minds as well as gather information from the relevant agencies to identify topics and preferred means of communication and factors which may hinder the effectiveness of flood risk communication. The research was successful in generating new knowledge about flood risk communication and its many facets, thus justifying the interpretivist position adopted by the research.

The research also demonstrated the reflexive and ever changing nature of flood risk communication and of the knowledge gaps between communities and communicating agencies. The research clearly demonstrated that the target population for flood risk communication cannot be considered as a homogeneous group. It also demonstrated that in order for flood risk communication with them to be effective, an in-depth understanding of how individuals perceived flood risk and viewed their role and responsibilities in relation to others as well as how they preferred to be informed and warned is required, thus justifying the adopted constructionist research position.

As demonstrated in Chapter 8 and section 9.4, the adopted research strategies generated findings which successfully fulfilled the aim and objectives of the research. The research also employed triangulation analysis for analysing data generated by two

separate methods and found the exercise very useful, for example, it demonstrated that the methods corroborated each other's findings, generated additional data and also provided explanations for findings from the postal survey, for instance why people did not take any preventive or protective action to minimise the impact of floods on their families despite being aware of the level of flood risk and the impacts of floods. Triangulation, thus, added to the rigour, validity and the range of the findings.

The findings of the research provided useful insights into flood risk communication related knowledge gaps, community expectations and their preferred media for flood risk awareness raising and flood warnings. These findings can play a very effective role for formulating credible flood risk communication strategies, primarily in Scotland. But many of the findings, such as topics for communication and preferred media for flood risk awareness and warning may be directly applicable to other parts of the world. Depending on the socio-economic context, existing policy and legislative arrangements and institutional frameworks, some of the factors which may affect the effectiveness of flood risk communication may need to be reassessed before formulating a flood risk communication strategy. The framework developed in this research which is presented in Figure 3.3 would be of immense value in such situations including communication of risks due to other natural hazards.

During this research, directly contacting the people by posting advertisements in the flood risk area received a very good response. It was also found that some of the focus group participants came to know about flood risk in their area after viewing the invitations for participation in focus group discussions. Therefore, it can be proposed that employing this type of communication methods and arranging such events may contribute to flood risk awareness in addition to providing useful information for evaluating flood risk communication efforts.

9.8 Limitations of the research

Although every care was taken to make the research as comprehensive as possible, due to resource constraints some sections of the communities living in the areas identified to be at risk of flooding were not included, for example local businesses. Although, the research did not specifically exclude this group, neither did it respond to postal surveys nor did it participate in any of the group discussions.

Further, the research did not make specific efforts to identify and include members of the community who can be categorised as more vulnerable. These are thought to be young children and elderly, parents with small children, pregnant women, people with short or long term immobility and people with disabilities like blindness and deafness. Despite this, the issues that are likely to be relevant to many of these groups of people were articulated by participants of the focus group discussions. The research also did not make efforts to include linguistically diverse members of the communities.

The research was also limited to the involvement of only two local authorities and related agencies. Although the data gathered from these two local authorities have led to useful findings, inclusion of a few more authorities may have provided additional data which could have been useful in formulating additional recommendations for developing a more effective flood risk communication strategy, for example in relation to rural areas. It should also be mentioned that the selection of the agencies for this research was finalised well before the implementation of the FRM(S) Act and as such it does not include Scottish Water and Scottish Flood Forum.

Related to the agencies is the limitation of the research in not extending beyond organisational boundaries to investigate how personal attributes such as attitudes, judgements, values, beliefs, commitment and skills of the individual staff of the agencies, as argued by literature (Lion et al. 2002 and Fleming et al. 2006) and which have largely remained un-investigated in the context of for flood risk communication, affected their flood risk communication task performance. Meglino and Ravlin (1998) and Kristof-Brown et al (2005) present a comprehensive set of such attributes which range from 'employee value', termed as desirable mode of behaviour, to relationships between person–job (PJ), person–organization (PO), person–group, and person–supervisor fit with pre-entry (such as applicant attraction, job acceptance, intent to hire, job offer) and post-entry individual-level criteria or attributes (such as attitudes, performance, withdrawal behaviours, strain, tenure). An investigation into this area to explore the implications for flood risk communication is recommended as a future research topic in the next section.

Finally, although this research has made significant recommendations which are based on comprehensive research, such an effort by a lone researcher should not be taken as a direct replacement of engaging with communities, especially when the research has only

generated new knowledge on reducing communication gaps to aid development of flood risk communication strategies, which is not the same as the much desired shared understanding on flood risk communication that is specific to specific communities. Actual engagement by an agency with the communities at flood risk in other locations may reveal unexpected and different issues from the ones identified by this research.

9.9 Priorities for future research

One of the topics which often emerged in the interview and focus group discussions was related to 'vulnerable people'. This group mainly includes young, elderly, infirm, single parents and people suffering from short or long term illnesses. This group does not appear to be given much consideration in the flood risk communication efforts so far. This is not surprising when this research found that no credible flood risk communication strategy existed even for the general population. Further, mainly due to data protection legislation, relevant agencies such as the health boards (for example, NHS) may not be willing to share sensitive or personal health information data with other agencies. Therefore, research on how best to share relevant personal information, including health related information, among the responsible agencies may be worth looking into. This would have implications not only for the flood risk communication but also for communication on other significant risks and issues.

This research identified various preferred media for flood risk awareness and warning purposes. It would be worth evaluating whether the media people indicated that they preferred were the same as the ones they actually use. With the evolution of new media and social communication sites, these preferences may shift easily, and longitudinal research in this area may be useful.

The limitations of the research stated that the research did not extend beyond organisational boundaries whilst investigating the agencies. While the importance of the capabilities and skills of personnel and agencies have been stressed in the literature (Lion et al. 2002 and Fleming et al. 2006), these have largely remained un-investigated. An investigation of this area centred on flood risk communication is recommended as a future research topic.

Future research into flood risk communication may also consider the need to advance understanding of national variations by conducting similar research in other countries of similar demographic and cultural background, for example, England, Wales, Northern Ireland, other European Union Member States and possibly Australia, New Zealand and North America (USA/Canada). Similarly, efforts may also be undertaken for advancing understanding of effective flood risk communication in developing economies such as India, China and Brazil which are frequently at risk of flooding.

It was found that the Media Synchronicity Theory does not fully support media selection for flood risk communication. In particular, the research demonstrated that the theoretical basis defining the synchronicity of the media has serious flaws. This was identified as a possible explanation for the inability of the theory to identify high performance media for carrying out flood risk communication tasks. Thus, reconsidering the theoretical basis for deciding the synchronicity of the media in the light of these observations is considered to be of value not only to the field of flood risk communication but also the more general field of risk communication and especially the field of media theories.

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Appendices

Appendix A: Postal survey questionnaire and cover letter

The Occupier
10 Road Road Road Road
Edinburgh
EH0 0AA

This is not a circular. Please read carefully.

Effective communication strategies for flood risk communication

Flooding is a high profile issue in Scotland that is likely to increase as a result of climate change. Heriot-Watt University is working with The City of Edinburgh Council to better understand what people already know about flooding and what other information they would like to have on flooding issues. The data will be used to develop more appropriate communication methods for flood advice and warnings.

Please answer the following questions as best you can and return the questionnaire in the envelope provided. We estimate that it will take you 10 to 15 minutes.

This questionnaire does not collect any sensitive personal data. Your responses to the enclosed questionnaire will be collected and processed by Heriot-Watt University. Individual responses will be kept confidential and analysed along with other responses.

School of the Built Environment
Sir William Arrol Building, Heriot-Watt University, Edinburgh, EH14 4AS
Telephone: +44 (0) 131 449 5111 Fax: +44 (0) 451 4617
www.sbe.hw.ac.uk

Edinburgh Campus Scottish Borders Campus

Place: Date: / /2009

Basic information sheet

1. **Your age:** ____years

2. **Gender:** ☐ Male ☐ Female

3. **Occupation:** **(Please specify)** _____

   ☐ Part time ☐ Full time ☐ Not working

4. **Postcode of your address**

   Postcode: _____

5. **How long have you been living at the current address?**

   Years: ____ months: ____

6. **What type of housing do you live in?**

   ☐ Own House

   ☐ Private Rented ☐ Council House ☐ Housing Association

   ☐ Other (please specify): _____

7. **Have you experienced flooding in the last 10 years?**

   ☐ Yes ☐ No

A. What do you know about flooding?

1. The risk of flooding to my area is:

☐ High (1) ☐ Medium (2) ☐ Low (3) ☐ Don't know (4)

2. What potential sources of flooding exist in your area?

(Please tick all that applies.)

1	☐ High river water level due to heavy rainfall
2	☐ High river water level due to tide
3	☐ Combination of high river water level and high tide
4	☐ Overloading of drains due to heavy rainfall
5	☐ Blocked drains
6	☐ Other (please specify): _____
7	☐ Don't know

3. Were a flood to occur in my area, it would result in (Please tick one or more responses):

1	☐ Loss or damage to furnishings and internal appliances
2	☐ Damage to non-replaceable sentimental items. e.g. family photographs
3	☐ Physical illness or mental stress
4	☐ Damage to my house
5	☐ Other (please specify) : _____
6	☐ No damage to my house
7	☐ No danger to my health
8	☐ Don't know

4. Do you take any action to limit the impact of flooding on your family? (Please tick one or more responses)

1	☐ Avoid keeping sentimental possessions on ground floor
2	☐ Avoid buying expensive downstairs furniture and furnishing
3	☐ Make permanent changes to the downstairs interior e.g. raising electrical sockets
4	☐ Others (please specify): _____
5	☐ No
6	☐ Don't know

5. Do you have a plan for action in the event of flooding?

☐ Yes (1) ☐ No (2) ☐ Not sure (3)

B. Information about flooding

6. What are your main sources of information relating to flood awareness and warning?

1	☐ Local public meetings, exhibitions
2	☐ Neighbours, local residents, friends and relatives
3	☐ Emergency services police / fire
4	Scottish Government (earlier Scottish Executive) ☐ Website ☐ Letter ☐ Leaflet
5	Weather forecasts ☐ TV ☐ Radio ☐ Website
6	Scottish Environment Protection Agency (SEPA) ☐ Website ☐ Letter ☐ Leaflet ☐ Floodline
7	Local Council ☐ Website ☐ Letter ☐ Leaflet
8	☐ News / Articles / programmes / advertisements in newspapers, TV, radio
9	☐ News in newspapers, TV, radio
10	Scottish Water ☐ Website ☐ Letter ☐ Leaflet

7. How satisfied are you about the information you receive from all sources relating to flood:

	Very Satisfied	Quite Satisfied	Neither satisfied nor dissatisfied	Quite dissatisfied	Very dissatisfied
The information is easy to understand	☐	☐	☐	☐	☐
The information is readily available	☐	☐	☐	☐	☐

8. What further information do you think you need to help raise your awareness about flooding?

1	☐ Causes and sources of floods
2	☐ Damage floods can cause to property
3	☐ Danger that floods can pose to health
4	☐ How to take preventive and protective measures before floods to minimise damage to your property and possessions
5	☐ How to take preventive and protective measures before floods to minimise danger to you and your family
6	☐ Information on level of risk during bad weather
7	☐ 'What to do' and 'what not to do' during flooding emergencies
8	☐ How to clear up after floods

9. Have you ever received a flood warning?

A) ☐ Yes ☐ No (please go to Q 10)

B) If yes, who issued this flood warning?

☐ 1 SEPA ☐ 2 Council ☐ 3 Don't know

☐ 4 Others (please specify): _____

C) Have you taken any action in response to a flood warning?

☐ Yes ☐ No (please go to Q 10)

D) What was the nature of this action?

Please specify: _____

C. Media usage / choice of media

Instruction: To answer the following questions please write the letter against the media as the answer. For example, if your answer is **'radio'**, write **'D'** as the answer.

A)	Newspaper	**G)**	landline / mobile phone voice call
B)	brochures or leaflets	**H)**	mobile phone text message
C)	television	**I)**	public announcement system e.g. loudspeaker
D)	radio	**J)**	exhibitions, seminars
E)	internet	**K)**	visit to your property
F)	e-mail		

10. For flood risk communication purposes, among the media listed in the Table above, please indicate which of the media:

a) are NOT available to you

answer: ___|___|___|___|___|___|___|___|___|___ ☐ Not applicable

b) you do NOT use due to high costs

answer: ___|___|___|___|___|___|___|___|___|___ ☐ Not applicable

c) you do NOT use because of technical or personal difficulty in using that media

answer: ___|___|___|___|___|___|___|___|___|___ ☐ Not applicable

d) you think would intrude into your privacy, if used for communication on issues such as flood risk

answer: ___|___|___|___|___|___|___|___|___|___ ☐ Not applicable

e) you do not use for any other reason

media: ___|___|___|___|___|___|___|___|___|___ ☐ Not applicable

reason: _____

f) you normally use on a day-to-day basis

answer: ___|___|___|___|___|___|___|___|___|___ ☐ Not applicable

D. Media preference

Instruction: To answer the following questions please write the letter against the media as the answer. For example, if your answer is **'radio'**, write '**D**' as the answer. Please write the three media which you most prefer.

A) Newspaper	**G)** landline / mobile phone voice call
B) brochures or leaflets	**H)** mobile phone text message
C) television	**I)** public announcement system e.g. loudspeaker
D) radio	**J)** exhibitions, seminars
E) internet	**K)** visit to your property
F) e-mail	

11. For receiving information related to FLOOD AWARENESS, which media, do you think, in order of preference, are the most appropriate for you

    answer: ___|___|___

12. For receiving FLOOD WARNING, which media do you think:, in order of preference, are the most appropriate for you

    answer: ___|___|___

Thank for your time and views!

Appendix B: Interview guide for one-to-one interviews

Interview Guide: one-to-one interviews of the public

a) Welcome and introduction

a. Welcome the interviewee and introduction
b. Purpose of the research
c. Sponsorship
d. Why and how the participants were selected
e. Recording and confidentiality declaration,
f. Who will be having access to information,
g. How the input will be used - results in summary form
h. When and where the output of the study will be available

Time: Approx: 10 min

b) Main session

1. Knowledge about floods

Time: Approx 10 min

1. What, do you think, are the possible causes or sources of flooding?

Prompt 1:	If you think about your property and the surroundings, where from can you possibly get water overflowing into your property?

2. What damage, do you think, can floods cause to properties and possessions?

Prompt 2:	Floodwaters may cause damage when they come in contact with something. What type of goods or possessions do you think floodwaters may cause damage to?
Prompt 3:	Some of the goods may not be replaceable, can you think of anything of this kind which may get damaged due to floodwaters?

3. What damage, do you think, can floods cause to affected lives?

Prompt 4:	Floodwaters may cause damage when they come in contact with something. How do you think this will affect people? Probe for health.

4. What other damage or loss, do you think, flooding can result into?

Prompt 5:	Can you think of any indirect losses due to floods? Like any extra costs? Damage to your garden?

5. What measures, do you think, can be taken before the occurrence of floods to avoid or reduce damage to property and possessions from flood?

Prompt 6:	How, do you think, can you prevent floodwaters entering your property?
Prompt 7:	What type of measures, do you think, can you take before the occurrence of the flood to minimise losses if floodwaters enter your property?

6. What measures, do you think, can be taken before the occurrence of floods to avoid or reduce damage to health and lives from flood?

Prompt 1:	How, do you think, you will keep yourself alert for possible flooding?
Prompt 2:	How, do you think, you will keep yourself prepared for action you will take before possible flooding?

7. What, do you think, should be done after receiving flood warning or if you think / are asked to evacuate?

Prompt 1:	Will you call someone? Whom?
Prompt 2:	What type of actions and preparations will you undertake to reduce damage to lives and property if in case floodwaters enter the property?

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2. Information, information sources and expectations

.A Awareness

Time: Approx 10 min

1. What type of information about flood awareness have you come across and from which organisation or agency?

Prompt 1:	Can you recall if you have seen anything in the library in your area, any news, or articles, any advertisement, etc. What was that? From which organisation or agency?

2. How satisfied are you about the content, format, language composition and frequency of communication related to flood awareness? Why?

Prompt 1:	Are all topics you think should be covered, are covered?
Prompt 2:	How about format and structure of the document, easy to understand?
Prompt 3:	How about technical words, language composition?
Prompt 4:	Is it available periodically?

3. Further Information on what specific topics, do you think, will help you raise your awareness about flooding?

Prompt 1:	What topics do you think are important to you and you need further information on to keep you aware and understand flooding?

4. Which organisation or agency, do you think, the information should come from? Why?

Prompt 1:	If you think Council, Why?
Prompt 2:	SEPA, why?
Prompt 3:	Police, why?
Prompt 4:	Scottish Government, why?

.B Warning / emergency

Time: Approx 10 min

1. What type of information about flood warning have you come across and from which organisation or agency?

Prompt 1:	Anything heard or seen on TV / radio
Prompt 2:	Any special announcement or wardens in your area?

2. How satisfied are you about the content, format, language composition and frequency of communication related to flood warning? Why?

Prompt 1:	Does it cover what you think you should know?
Prompt 2:	How about format and structure of the message, easy to understand?
Prompt 3:	How about technical words, language composition?
Prompt 4:	Was it available periodically available before and during emergency?

3. What information do you expect from a flood warning? Why?

Prompt 1:	What type of instructions or information? What about applicable time?

4. Which organisation or agency, do you think, the flood warning should come from? Why?

Prompt 1:	Council, why?
Prompt 2:	SEPA, why?
Prompt 3:	Police, why?
Prompt 4:	Scottish Government, why?

3. Media usage / choice of media

Time: Approx 10 min

	Unaddressed	Addressed
Print media	**A)** newspaper, **B)** brochures, **C)** booklets, **D)** leaflets/pamphlets	**E)** letters **F)** brochures, **G)** booklets, **H)** leaflets/pamphlets
New media/ Electronic media	**I)** television news and programs **J)** television-teletext **K)** radio **L)** internet **M)** public announcement system, loudspeaker	**N)** e-mail **O)** landline phone voice call **P)** cell phone text message **Q)** cell phone voice call
Face-to-face	**R)** exhibitions, seminars	**S)** visit to your property

1. Among the media as shown in the matrix, what types of considerations or factors influence your media choice for issues such as flood risk awareness and warning?
   a. Issue no. 1: _____ Why? Which media? Run through the list.
   b. Issue no. 2: _____ Why? Which media? Run through the list.
   c. Issue no. 3: _____ Why? Which media? Run through the list.
   d. Issue no. 4: _____ Why? Which media? Run through the list.
   e. Issue no. 5: _____ Why? Which media? Run through the list.
   f. Issue no. 6: _____ Why? Which media? Run through the list.

Prompt 1:	Among the media as shown in the matrix, are there any issues relating to availability which influence your media choice for flood risk awareness and warning? Which media?
Prompt 2:	Among the media as shown in the matrix, are there any issues relating to cost which influence your media choice for flood risk awareness and warning? Which media?
Prompt 3:	Among the media as shown in the matrix, are there any issues relating to intrusion into your privacy which influence your media choice for flood risk awareness and warning? Which media?
Prompt 4:	Among the media as shown in the matrix, are there any issues relating to technical or personal difficulty in using certain media which influence your media choice for flood risk awareness and warning? Which media?
Prompt 5:	Apart from availability, cost, privacy and technical or personal difficulty, do you think, there are any other issues which influence your media choice for flood risk awareness and warning? What issues?

4. Media preference

Time: Approx 10 min

1. Among the media as shown in the matrix, which media, in your order of preference, do you think, are the most appropriate specifically for receiving information about increasing your awareness about flooding? Why?
   Preferred media 1: _____: Why?
   Preferred media 2: _____: Why?
   Preferred media 3: _____: Why?

2. Among the media as shown in the matrix, which media, do you think, are inappropriate specifically for receiving information about increasing your awareness about flooding? Why?
   Not Preferred media 1: _____: Why?
   Not Preferred media 2: _____: Why?
   Not Preferred media 3: _____: Why?

3. Among the media as shown in the matrix, which media, in your order of preference, do you think, are the most appropriate specifically for receiving flood warnings? Why?
   Preferred media 1: _____: Why?
   Preferred media 2: _____: Why?
   Preferred media 3: _____: Why?

4. Among the media as shown in the matrix, which media, do you think, inappropriate specifically for receiving flood warnings? Why?
   Not Preferred media 1: _____: Why?
   Not Preferred media 2: _____: Why?
   Not Preferred media 3: _____: Why?

5. Get basic information sheet filled up

c) Thank and close

Place: _____ Date: / / 2008

Basic information sheet

1. Your age: ____years
2. Gender: ☐ Male ☐ Female
3. If working ☐ Part time ☐ Full time ☐ Not working
4. Occupation: ☐ Office based work ☐ Field based work ☐ Business
   ☐ Retired ☐ Student ☐ Other / Not working
5. How long have you been living at the current address?
   Years: ____ months: ____
6. Where have you been staying before?
   Postcode: _____
7. Do you own this property?
   ☐ Yes ☐ Rented ☐ Other (Please specify: _____)
8. Do you have earlier flooding experience?
   ☐ Yes ☐ No
9. Have you taken any action to prevent damage from flooding at your property? This may include having flood kit at home, flood insurance, arrangements for getting flood warnings in time, structural changes to prevent damage from flood waters, etc.
   ☐ Taken enough action ☐ Taken some action ☐ Not taken any action

Any comments and suggestions: _____

Thank for your time and views!!!

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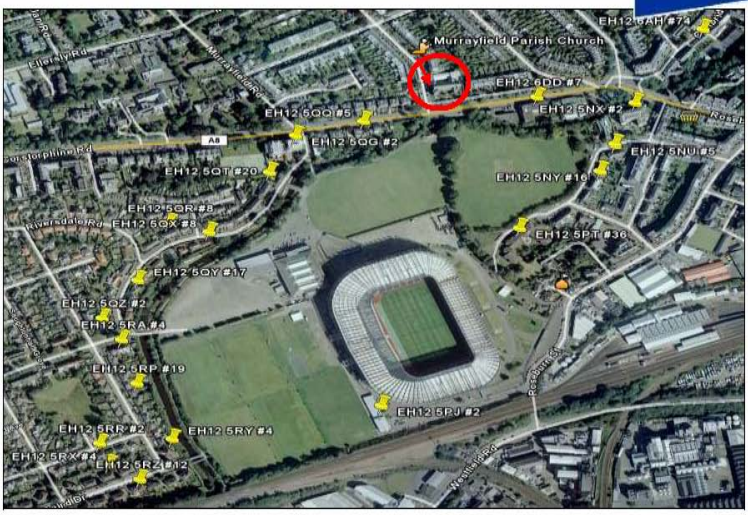
Appendix C: Recruiting participants for focus group discussions

Invitation to
Group discussion on flooding

HERIOT WATT UNIVERSITY



Properties at flood risk around Murrayfield Stadium

Note: The illustration shows the centre of the postcode and the number of properties in that postcode – NOT the actual property! Only postcodes having more than one property at risk are shown.

Kindly refer to the above illustration showing the properties at flood risk from the Water of Leith in your area.

We at Heriot-Watt University are researching on the **effective ways of communicating flood risk** to **people living in flood risk areas**.

We would like to invite you for a group discussion with others residing in your neighbourhood. This will give you an opportunity to discuss the risks of flooding in your area. Your comments will be used to contribute to research that will be of help in the larger interests of the community. **The group discussion will last for about 1 hour and light refreshments will be provided.** In addition, you will get £20.00 honorarium in appreciation of your time! The research is fully funded by Heriot-Watt University only.

Interested? We would be very pleased to see you!

Thanks in advance!

Date and time: Friday, 27 Feb 2009 from 10:15 AM to 12:00 PM

Venue: Stage room, Murrayfield Parish Church, 2b Ormidale Terrace, Edinburgh, EH12 6EQ

Light refreshments will be provided and you will get £20.00 honorarium in appreciation of your time!

Please RSVP Sanghmitra on 078 508 717 95 or spp1@hw.ac.uk

Group discussion on flooding by Heriot-Watt University

Date and time: Friday, 27 Feb 2009 from 10:15 AM to 12:00 PM

Venue: Stage room, Murrayfield Parish Church, 2b Ormidale Terrace, Edinburgh, EH12 6EQ

Light refreshments will be provided and you will get £20.00 honorarium in appreciation of your time!

Please RSVP Sanghmitra on 078 508 717 95 or spp1@hw.ac.uk

Appendix D: Interview guide for SEPA

Interview Guide

Scottish Environment Protection Agency

Flood risk awareness

What is SEPA's role in relation to raising awareness of flooding?

A) How does SEPA raise flood risk awareness among people residing in flood risk areas?

1. What are the SEPA's legal responsibilities in relation to flood risk awareness?
2. What criteria does SEPA use to identify areas where it disseminates information to raise awareness of flooding? Does SEPA have a role in raising awareness of flooding among the general public and not just those living in 'flood risk areas'?
3. I understand that SEPA's flood risk awareness efforts may vary across geographical areas. Can you tell me what factors are likely to influence where SEPA concentrates most attention in raising flood risk awareness?
4. On what topics does SEPA provide information to people residing in flood risk areas?
5. Is the content of the information tailored in any way for different groups of people? If yes, can you provide more details?
6. What are the media employed for providing such information? i.e. What is the media which SEPA uses most commonly? Why?
7. Does SEPA use different media for people living in urban or rural areas, areas at great risk of flooding or lower risk of flooding?
8. How often does SEPA provide information to people living in flood risk areas? i.e. What is the frequency of providing such information and when is this information provided? Are there any specific times of the year when SEPA provides information to raise awareness of flooding?
9. How does SEPA assess that the information is received and understood by the target population?
10. What are SEPA's future plans related to flood risk awareness?

B) Partnership working

1. Are there any organisations / agencies with which SEPA works to raise flood risk awareness of people residing in flood risk areas? If yes, which organisations / agencies?
2. How does SEPA do this?

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3. Is SEPA aware of any gaps or overlaps between organisations or agencies in raising awareness of flooding?
4. In SEPA's view what are the benefits or difficulties related to working in partnerships?

Flood warning

What is SEPA's role in relation to providing flood warnings to people residing in flood risk areas?

A) How does SEPA disseminate flood warnings to people at flood risk?

1. What are the SEPA's legal responsibilities in relation to flood warnings?
2. I understand that SEPA's flood warning efforts may vary across geographical areas. Can you tell me what factors are likely to influence where SEPA concentrates most attention in issuing flood warnings?
3. What is the risk level of flooding when warning is issued?
4. What information is communicated in the flood warning?
5. Which are the most commonly used media? Why? Does this vary according to severity of flooding? Does this vary according to urban or rural area?
6. How does SEPA assess that the warning is received and understood by the target population?
7. What are SEPA's future plans related to flood risk warning?

B) Partnership working

1. What is the risk level when flood warning is issued to organisations / agencies?
2. What is the frequency of providing flood warnings to organisations / agencies?
3. Is the information tailored for individual organisations / agencies? If yes, what information is communicated in the flood warning to each individual organisation / agency? Please list one by one. If no, what information is communicated in the common flood warning?
4. How does SEPA assess that the warning is received and understood by the target organisations / agencies?
5. Does SEPA have a responsibility of monitoring whether suitable action is taken by the relevant organisations / agencies?
6. Is SEPA aware of any gaps or overlaps between agencies in communicating flood risk warnings?
7. In SEPA's view what are the benefits or difficulties related to working in partnerships?

Appendix E: Interview guide for agencies other than SEPA

Interview Guide

The Councils

Flood risk awareness

A) What is the Council's role in relation to flood risk awareness to the people residing in flood risk areas? i.e. How does the Council undertake flood risk awareness of people residing in flood risk areas?

1. What are the Council's legal responsibilities in relation to flood risk awareness?
2. Does the Council undertake flood risk awareness, if yes:
    a. What criteria does the Council use to identify areas where it disseminates information to raise awareness of flooding? Does the Council have a role in raising awareness of flooding among the general public and not just those living in 'flood risk areas'?
    b. I understand that the Council's flood risk awareness efforts may vary across geographical areas. Can you tell me what factors are likely to influence where the Council concentrates most attention in raising flood awareness?
    c. On what topics does the Council provide information to the people residing in flood risk areas?
    d. Is the content of the information tailored in any way for different groups of people?
    e. What are the media employed for providing such information? What is the media which the Council uses most commonly? Why?
    f. Does the Council use different media for people living in urban or rural areas, areas at great risk of flooding or lower risk of flooding?
    g. How often does the Council provide information to people living in flood risk areas? i.e. What is the frequency of providing such information and when is this information provided? Are there any specific times of the year when the Council provides information to raise awareness of flooding?
    h. How does the Council assess that the information is received and understood by the target population?
    i. What are the Council's future plans related to flood risk awareness?

    If no, proceed to the next section.

B) Partnership working

1. Apart from SEPA, does the Council liaise with any other organisations / agencies for flood risk awareness of people residing in flood risk areas? If yes:

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a. Which?
b. What is the nature of the activities involved?
c. What are the benefits or difficulties related to working in partnerships?

If no, proceed to the next section.

Flood warning

A) What is the Council's role in relation to flood warning to the people residing in flood risk areas? i.e. How does the Council disseminate flood warnings to the people at flood risk?

1. What are the Council's legal responsibilities in relation to flood warnings?
2. Does the Council undertake flood risk warning, if yes:
3. How does the Council know to which areas flood warnings are to be issued?
4. I understand that the Council's flood warning efforts may vary across geographical areas. Can you tell me what factors are likely to influence where the Council concentrates most attention in issuing flood warnings?
5. What is the risk level when flood warning is issued?
6. What information is communicated in the flood warning?
7. Which are the most commonly used media? Why? Does this vary according to severity of flooding, urban or rural area, etc.?
8. How does the Council assess that the warning is received and understood by the target population?
9. What are the Council's future plans related to flood risk warning?

B) Partnership working

1. Apart from SEPA, does the Council liaise with any other organisations / agencies for flood warning to people residing in flood risk areas? If yes:
   a. Which?
   b. What is the nature of the activities involved?
   c. What are the benefits or difficulties related to working in partnerships?
   d. Are there any gaps or overlaps in terms of the activities conducted?

Appendix F: Coding scheme

Main code	Sub-codes	Further sub-codes
Communities-data		
Sources	natural waterbodies	rivers and natural flow-paths, high seas, groundwater, surface flow
	manmade infrastructure	sewers and drains
Causes	weather related, mismanagement of floodwaters	high rainfall, high tides, floodplain encroachment, planning control, floodwater management, reservoir operations, infrastructure maintenance, other operations
Risk level	low, medium, high, don't know	
Damage & effects	properties & possessions, health & lives, tangible, intangible, direct, indirect	structural, furniture, possessions, anxiety, infection, roads, gardens, wages, insurance, relocation, inconvenience, repair costs, disruption, loss of life, personal, public infrastructure
Preventive & protective measures	before flooding, during flooding	flood action plan, permanent or temporary, structural changes, emergency contacts, protecting self & own family, protecting others, signing to flood alerts, watching river, weather awareness
Information	content, sources, expectations	topics, agencies, media, timing, frequency, active or passive dissemination, format, language, awareness, help, roles and responsibilities, level of satisfaction, flooding emergency plan, evacuation plan, shelters
Media	usage	availability, cost, privacy, technical or personal difficulties, others
	preference	awareness raising, flood warning, format, content, timing, frequency, agencies, issues (data protection, privacy)
Agencies-data		
Raising awareness	responsibilities,	legal, voluntary
	areas/localities	criteria
	topics & content tailoring	languages, relevance
	media	type, timing, frequency
	feedback	efficiency, effectiveness, relevance
	future plans	planned improvements and activities, issues and difficulties, timings
Flood warning	responsibilities,	legal, voluntary
	areas/localities	criteria
	topics & content tailoring	languages, relevance
	media	type, timing, frequency
	feedback	efficiency, effectiveness, relevance
	future plans	planned improvements and activities, issues and difficulties, timings
Partnership working	names of agencies	
	arrangement type	formal, informal
	gaps & overlaps	issues and remedies
	benefits & difficulties	issues and remedies
	information sharing	timing, frequency, information tailoring, feedback, benefits & difficulties
	future plans	planned improvements and activities, issues and difficulties, timings

Appendix G: Positionality statement

As mentioned in section 4.8.3, the purpose of this positionality statement is to make me, the researcher, and my 'worldviews' or my perspectives more visible to you, the readers. Such a declaration is also known as 'reflexivity' – a reflexive account by the researchers declaring their conceptual journey as they undertook the research. The statement provides information about me and my family, my educational and professional background, how I decided to choose this research topic, and my research journey.

I was born and brought up in Aurangabad which is an industrial township in Maharashtra state of India. I hold a postgraduate degree in Mass Communication and Journalism but my journalism background spans to my undergraduate years when I worked as a journalist for a newspaper daily. After post-graduation and prior to joining postgraduate research programme at Heriot-Watt University for this research, I worked in India (mainly in Aurangabad, New Delhi and Kolkata) in various related roles: a public relations officer for a hospital, as university lecturer for teaching Mass Communication and Journalism for two different universities, a newspaper editor responsible for editorials but it also included investigative journalism, a TV Newsreader, a field researcher for collecting data on water & sanitation, and as editor for two different magazines of two different Ministries of Government of India: Social Justice & Empowerment and Information & Broadcasting. I have also prepared a video documentary, have presented few radio programmes and have anchored functions / ceremonies as well as organised events.

My husband is a Civil Engineer specialised in water resources engineering, especially flood modelling. Therefore, water resources, water security, flooding and obviously the questions surrounding communication of flood risk were not new to me. He had moved to the United Kingdom for pursuing PhD in Flood Modelling. Subsequent discussions with him and some literature review prompted me to apply for a PhD in Flood Risk Communication. In summary, my PhD topic has deep roots in my family and also has relevance to my educational background as well as my work experience.

I was acquainted with 'flooding' and 'communication' as two separate topics but my PhD was about marrying these two disciplines. Although using content analysis as the

research method also could have resulted in a credible PhD, I was keen for field research in order to ensure much greater relevance to people, practitioners and policymakers. Further, I was keen to utilise my time in the UK in a better manner by interacting with people, rather than sifting through documents only.

Compared to Local Community Councils, I found the government agencies (SEPA, Police, Fire & Rescue and the Local Authorities) to be much more approachable, cooperative, transparent and keen to learn and improve their services. I visited their offices for the interviews. I had my hair cut short and I mostly wore skirts and jeans together with shirts/t-shirts. Mostly people would think of me being an eastern European but I had not made any changes in my looks just because I was now among westerns or wanted to mingle with them. Nevertheless, I realised that my 'localised' and 'studentish' look made the interviewees more comfortable. The reactions of focus group participants too were similar. I realised that they were convinced that I am one of them and am there for their cause (both the agencies and public). If I had been an older looking lady in traditional Indian attire, I am not sure whether I would have been provided with similar in depth information; most likely it would have been different.

The research participants belonging to the communities were paid honorarium to participate in the research. I observed that except one or two in a group of 15 to 20 participants, rest of the participants spoke passionately about their experiences and views. Money did not seem to have attracted them; which some even refused. I also realised that the fact that there was an honorarium on offer made them to take my research seriously. Despite clarifications, some seemed to believe that I was an 'agent' of SEPA or the Local Authorities and they wanted me to convey their concerns to these agencies.

On similar lines, I had also made it clear right from the invitation stage that the topic of discussion would be the risk of flooding in their neighbourhood. I believe that had I not made this clear in this way, for example if I had mentioned that it would be a discussion on one of the most important environmental issue in their area, the level of interest might have been different; and I might have ended up listening to views on a range of topics such as fly tipping, smells, pollution, to more 'hip' topics like climate change and global warming. At hindsight, therefore, I think that my approach and background has benefitted the research.